

Appendix I4

Biological Opinion & Biological Assessment

Part 4 of 4

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ATTACHMENT 3

Avian Species Detected During US 281 GCWA Surveys – Spring 2010

Avian Species Detected During US 281 GCWA Surveys – Spring 2010

Species Identification*				Date					
Family (Subfamily)	Scientific Name	Common Name	Code	3/31/10	4/8/10	4/14/10	4/29/10	5/13/10	5/26/10
Anatidae (Dendrocygninae)	<i>Dendrocygna autumnalis</i>	Black-bellied Whistling Duck	BBWD	x					
Cathartidae	<i>Coragyps altratus</i>	Black Vulture	BLVU	x	x		x	x	
Cathartidae	<i>Cathartes aura</i>	Turkey Vulture	TUVU	x	x	x	x	x	
Accipitridae (Accipitrinae)	<i>Accipiter cooperii</i>	Cooper's Hawk	COHA	x					
Accipitridae (Accipitrinae)	<i>Buteo jamaicensis</i>	Red-tailed Hawk	RTHA	x					
Falconidae	<i>Falco sparverius</i>	American Kestrel	AMKE				x		
Odontophoridae	<i>Colinus virginianus</i>	Northern Bobwhite	NOBO			x			
Columbidae	<i>Columbia livia</i>	Rock Pigeon	ROPI	x	x		x	x	
Columbidae	<i>Zenaida asiatica</i>	White-winged Dove	WWDO	x	x	x	x		x
Columbidae	<i>Zenaida macroura</i>	Mourning Dove	MODO	x	x		x	x	x
Columbidae	<i>Columbina passerina</i>	Common Ground Dove	COGD		x				
Cuculidae (Cuculinae)	<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	YBCU				x	x	x
Strigidae	<i>Strix varia</i>	Barred Owl	BADO		x				
Apodidae (Chaeturinae)	<i>Chaetura pelagica</i>	Chimney Swift	CHSW				x	x	
Trochilidae (Trochilinae)	<i>Archilochus alexandri</i>	Black-chinned Hummingbird	BCHU	x	x	x	x		
Picidae (Picinae)	<i>Melanerpes aurifrons</i>	Golden-fronted Woodpecker	GFOW	x					
Picidae (Picinae)	<i>Picoides pubescens</i>	Downy Woodpecker	DOWO		x				
Tyrannidae (Fluvicolinae)	<i>Sayornis phoebe</i>	Eastern Phoebe	EAPH	x	x	x	x	x	
Tyrannidae (Tyranninae)	<i>Tyrannus tyrannus</i>	Eastern Kingbird	EAKI					x	
Tyrannidae (Tyranninae)	<i>Tyrannus forficatus</i>	Scissor-tailed Flycatcher	STFL	x					
Vireonidae	<i>Vireo griseus</i>	White-eyed Vireo	WEVI	x	x	x		x	
Corvidae	<i>Aphelocoma californica</i>	Western Scrub-Jay	WESJ	x	x		x	x	x
Corvidae	<i>Corvus brachyrhynchos</i>	American Crow	AMCR						x
Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	BARS			x			
Hirundinidae	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	CLSW	x			x		
Paridae	<i>Poecile carolinensis</i>	Carolina Chickadee	CACH	x	x	x	x	x	x
Paridae	<i>Baeolophus bicolor</i>	Black-crested Titmouse	BCTI	x	x	x	x	x	x
Troglodytidae	<i>Thryothorus ludovicianus</i>	Carolina Wren	CARW	x	x	x	x	x	x
Troglodytidae	<i>Thryomanes bewickii</i>	Bewick's Wren	BEWR	x	x	x	x	x	x
Regulidae	<i>Regulus calendula</i>	Ruby-crowned Kinglet	RCKI	x	x		x		
Sylviidae (Polioptilinae)	<i>Poliophtila caerulea</i>	Blue-gray Gnatcatcher	BGGN	x	x	x	x		

Avian Species Detected During US 281 GCWA Surveys – Spring 2010

Species Identification*				Date					
Family (Subfamily)	Scientific Name	Common Name	Code	3/31/10	4/8/10	4/14/10	4/29/10	5/13/10	5/26/10
Turdidae	<i>Catharus guttatus</i>	Hermit Thrush	HETH		x				
Mimidae	<i>Mimus polyglottus</i>	Northern Mockingbird	NOMO	x	x	x	x	x	x
Sturnidae	<i>Sturnus vulgaris</i>	European Starling	EUST		x		x		
Bombycillidae	<i>Bombycilla garrulus</i>	Cedar Waxwing	CEDW	x					
Parulidae	<i>Vermivora celata</i>	Orange-crowned Warbler	OCWA	x		x			
Parulidae	<i>Vermivora ruficapilla</i>	Nashville Warbler	NAWA	x	x	x	x		
Parulidae	<i>Dendroica petechia</i>	Yellow-rumped Warbler	YRWA		x				
Emberizidae	<i>Pipilo maculatus</i>	Spotted Towhee	SPTO			x			
Emberizidae	<i>Aimophila ruficeps</i>	Rufous-crowned Sparrow	RCSP	x	x	x	x	x	x
Emberizidae	<i>Spizella passerina</i>	Chipping Sparrow	CHSP	x			x	x	x
Emberizidae	<i>Spizella pusilla</i>	Field Sparrow	FISP				x		
Cardinalidae	<i>Piranga rubra</i>	Summer Tanager	SUTA		x	x			
Cardinalidae	<i>Cardinalis cardinalis</i>	Northern Cardinal	NOCA	x	x	x	x	x	x
Cardinalidae	<i>Passerina cyanea</i>	Indigo Bunting	INBU			x			
Cardinalidae	<i>Passerina caerulea</i>	Painted Bunting	PABU			x	x	x	x
Icteridae	<i>Quiscalus mexicanus</i>	Great-tailed Grackle	GTGR	x	x		x	x	x
Icteridae	<i>Molothrus ater</i>	Brown-headed Cowbird	BHCO	x	x	x	x	x	x
Fringillidae (Carduelinae)	<i>Carpodacus mexicanus</i>	House Finch	HOFI	x	x		x	x	x
Fringillidae (Carduelinae)	<i>Carduelis psaltria</i>	Lesser Goldfinch	LEGO	x	x	x	x	x	x
Passeridae	<i>Passer domesticus</i>	House Sparrow	HOSP			x	x	x	

*Nomenclature according to: AOU (2010) & Pyle and DeSante (2010)

ATTACHMENT 4

Site Photos of Representative Habitat



Block 1 -- Representative Habitat -- Note Manicured Understory



Block 2 -- Representative Habitat -- Note Overgrazed Condition



Block 6 -- Representative Habitat



Block 7 -- Representative Habitat



Block 9 -- Representative Habitat



Block 12 – Dismissed from Survey due to Ashe Juniper Removal in Entire Block



Block 7 – Portion Dismissed from Survey Due to Ashe Juniper removal



Block 9 -- Ailing Live Oaks Infected by Hypoxylon Canker

ATTACHMENT 5

GCWA Presence Absence Field Data Forms

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

Study Site	US-281	Weather Conditions		
Tract #	BLOCKS		Begin	End
Visit #	1	Temperature	55°F	78°F
Date	3/31/10	Cloud Cover	Clear	Clear
Observer	J. Kuhl + J. Allen	Precipitation	None	None
Time Begin-End	7:45 am - 3:00 pm	Wind Speed/Direction	0-5/5	5-10/5
General Survey Notes (e.g., Additional wildlife information, etc.)				

* ~~Plots~~ Blocks 3 & 4 no ROEs. Blocks 5 & 10 ~~are~~ not on maps...

Block#1 = no ROE

4 for labor 7 at

BLVN	ROPT	STFL
TWVN	WVDO	EAPH
BBWD	MODD	WEVI
RTHA	BCHU	SLTA
GOTHA	GFWP	CLSW

CACH
BCTI
CARV
BEW
RCV

BGGN
NOMO
CEDW
NAWA
DCWA

RCSP
CHSP
ADCA
GTGR
BACT

HOFI
LEGE

Grey Fox
WTD

[illegible]

Bird Observation Notes – (Age (HY, SY, ASY), behavior observed, etc.)

No GCWA detected

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

Study Site	Weather Conditions			
Tract # <i>Blocks</i>	<i>US 281</i>		Begin	End
Visit #	<i>1, 2, 6, 7, 9 + 12</i>	Temperature	<i>40° F.</i>	<i>63° F.</i>
Date	<i>4/8/10</i>	Cloud Cover	<i>Clear</i>	<i>Clear</i>
Observer	<i>T. S. & T. Allen</i>	Precipitation	<i>None</i>	<i>None</i>
Time Begin-End	<i>7:30 - 11:30</i>	Wind Speed/Direction	<i>0-5/N</i>	<i>5-10/N</i>
General Survey Notes (e.g., Additional wildlife information, etc.)				

Wt Deer

[illegible]

Bird Observation Notes – (Age (HY, SY, ASY), behavior observed, etc.)

no GCWA detected

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

Study Site	Weather Conditions		
Tract #	Begin	End	
Visit #	Temperature	64°F	70°F
Date	Cloud Cover	100%	100%
Observer	Precipitation	—	mist
Time Begin-End	Wind Speed/Direction	0-3/S	—

General Survey Notes (e.g., Additional wildlife information, etc.)

TUVU	CACH	OCWA	INBU
WUDD	BCTI	NAWA	PABU
BCHU	CARW	SUTA	BHCO
EAPH	BEWR	SPTD	LEGO
WEVI	BGGN	RCSP	HOSP
BARS	NOMO	NOCA	- W

- white-tailed deer

[illegible]

Bird Observation Notes – (Age (HY, SY, ASY), behavior observed, etc.)

*No GCWA detected

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

Study Site	US 281	Weather Conditions		
Tract #	Act/Blocker 1, 2, 6, 7, 9 + 12)		Begin	End
Visit #	4	Temperature	66°F	82°F
Date	4/29/10	Cloud Cover	Overcast	Clean
Observer	JK	Precipitation		
Time Begin-End	0730-1pm	Wind Speed/Direction	0-5/S	5-10/S
General Survey Notes (e.g., Additional wildlife information, etc.)				

BLVN	YBCU	CACH	NOAO	NOCA
TWU	CHSW	BCTI	EUST	PABU
AMKE	BCHU	CARW	NANA	GTGR
ROPI	EAPH	BEWR	FISP	BHCO
WUDO	WEST	CKLI	RCSP	HOPI
MO DO	CLSW	BGGN	CHSP	LEGO
				HOSP

[illegible]

Bird Observation Notes – (Age (HY, SY, ASY), behavior observed, etc.)

- No GCWA detected

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

Study Site	K5281	Weather Conditions		
Tract #	Blocks 1, 2, 6, 7, 9, & 12		Begin	End
Visit #	5	Temperature	70°F.	80°F
Date	5/13/10	Cloud Cover	Cloudy	Cloudy
Observer	J. Kuhl	Precipitation	—	—
Time Begin-End	0730-1200	Wind Speed/Direction	0-5	5-10
General Survey Notes (e.g., Additional wildlife information, etc.)				

BLVU	EAPH	CARW	PABU	• HT Deen
TUVU	EAKI	BEWR	GTGR	• Cotton tail
ROPI	WEVI	NOMO	BHCO	
MODD	WEST	RLSP	HOFI	
YBCU	CACH	CHSP	LEGO	
CHSW	BC TI	NOCA	ITSP	

[illegible]

Bird Observation Notes – (Age (HY, SY, ASY), behavior observed, etc.)

No GCWA detected...

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

WWDO	CACH	RCSP	BHCO	Contact Leopard Frog
MODD	BCTI	CHSP	HOPI	
YBCU	CARW	NOCA	LEGO	
WEST	BEWR	PABU		
AMCR	NOMO	GTGR		

Bird Observation Notes – (Age (HY, SY, ASY), behavior observed, etc.)

No GCWA detected - played ^{GCWA} tapes ~~at~~ all blocks visited with no response. Absence of GCWA documented in second consecutive year.

**Golden-cheeked Warbler Survey
US 281
from Loop 1604 to Borgfeld Drive
Bexar County, Texas**

**Submitted to:
Jacobs
Alamo Regional Mobility Authority
Texas Department of Transportation**

June 4, 2014

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1.0 INTRODUCTION

This report documents the results of a third year of surveys for the federally and state-listed endangered Golden-cheeked Warbler (*Setophaga chrysoparia*) (GCWA) within and adjacent to the project corridor for proposed improvements between Borgfeld Drive and Loop 1604 along US 281 in Bexar County, Texas. This survey, conducted by Hicks & Company (H&C) personnel, follows up a habitat assessment and survey conducted by Blanton & Associates, Inc. (B&A) during the 2009 breeding season (B&A 2009) and a survey conducted by H&C during the 2010 breeding season (H&C 2010). The habitat assessment and surveys were conducted on behalf of the Alamo Regional Mobility Authority (Alamo RMA) and the Texas Department of Transportation (TxDOT) and, to date, have resulted in negative findings for GCWA presence. A letter from the U. S. Fish and Wildlife Service (USFWS) dated May 11, 2011, concurred with the 2009 and 2010 negative findings; however, the letter states that surveys should be conducted if construction is delayed more than three years. Because of this, H&C conducted the third year of survey during the 2014 breeding season. The results of this survey are documented herein.

The proposed project includes improvements to an approximately eight-mile stretch of US 281 extending from the south at Loop 1604, within the city of San Antonio, to the north at Borgfeld Drive in northern Bexar County, Texas (**Figure 1** in **Attachment 1**). The four direct connector ramps that comprise the northern half of the US 281 interchange with Loop 1604 are included in the proposed improvements. The proposed action has the logical termini of Loop 1604 on the south and Borgfeld Drive on the north, which provide rational end points for transportation improvements and review of environmental impacts; however, construction of the proposed improvements would extend north of Borgfeld Drive to approximately the Bexar-Comal County Line (Cibolo Creek) in order to tie the improvements back to the existing US 281 lanes. These surveys are intended to provide data to assess potential impacts to this endangered songbird.

Thirteen blocks of potential habitat totaling approximately 231 acres were identified and delineated within the 500-foot buffer from the proposed right of way during the 2009 habitat assessment (**Figure 2** in **Attachment 1**). These habitat blocks were further refined during the 2009 and 2010 survey efforts. Our general approach was to survey habitat mapped and refined during the 2009 habitat assessment and 2009 and 2010 surveys within the 500-foot buffer from the proposed right of way. Presence/absence surveys were conducted each season on the delineated habitat according to appropriate U.S. Fish and Wildlife Service (USFWS) protocols. A field visit was conducted on March 14, 2014, to reassess the potential habitat areas delineated in 2009. Approximately 32.14 acres of potential GCWA habitat was added to Block 2 on the northern end of the proposed project.

Figures 3.1 to 3.10 in **Attachment 1** depict the proposed right of way and the delineated habitat areas within the 500-foot buffer that were surveyed by H&C during the 2014 GCWA breeding season. Discussion of GCWA natural history, study methodologies, and results follow.

2.0 GOLDEN-CHEEKED WARBLER NATURAL HISTORY

GCWA Description

The GCWA is a small, neo-tropical songbird in the family Parulidae. Male GCWAs have a black back, throat, upper breast, and crown, white belly, black-streaked sides, white wing bars, and a black line through the eye with large yellow patches both above and below the eye. Female and immature GCWAs are duller, with olive upperparts with dark streaks and a yellowish or white chin (NatureServe 2012).



GCWA Habitat

According to the recovery plan, the GCWA inhabits two distinctly different habitat types: closed-canopy Ashe-juniper woodland in central Texas and pine-oak woodland in the highlands of southern Mexico to Nicaragua (USFWS 1992). The Ashe juniper-oak woodland is the breeding habitat for the GCWA in Central Texas. The GCWA nests only in climax stage woodlands with a high proportion of mature Ashe juniper trees interspersed with other deciduous species, and prefer areas with a moderate to high tree density with dense foliage in the upper levels (USFWS 1992). According to Ladd and Gass (1999), forest stands where GCWAs are typically found average about 40 years in age and 20 feet in height with about 70 percent canopy cover and a tree density of 400 trees per acre. The TPWD defines habitat as containing Ashe juniper minimally 15 feet tall with an average canopy height of 20 feet, canopy cover of 35 percent and containing at least 10 percent oaks (Campbell 2003). Klassen (2011) demonstrates that this can vary throughout the warbler's range as she documents successful Kinney and Edwards County (southwest extreme of the GCWA range) breeding in areas with 20–25 percent canopy closure containing as low as three percent oaks.

The mature Ashe juniper is a key habitat feature for the GCWA since the main component in the species' nest is strips of bark from aged juniper trees. The loose, stringy bark found in the species' nest is only observed in older, mature trees, which accounts for the reliance of the GCWA on mature Ashe juniper stands. A study by J.C. Kroll (1980) found that Ashe juniper trees began sloughing bark near the base of the tree by 20 years of age and by the crown at 40 years. A few other factors may contribute to an improved habitat for GCWAs. Ladd (1985) noticed that the suitable habitat for the species coincided with steep canyons or rugged slopes, but nests are not limited to canyons (Guilfoyle 2002). GCWAs may be associated with canyon slopes because of a combination of other factors influencing the habitat quality: 1) greater surface run-off and seepage, which favors growth of preferred tree species and increases arthropod availability, 2) protection from wildfires, or 3) increased protection against the threat of clearing due to the high cost that comes with clearing steep slopes (USFWS 1992).

More recent studies indicate an important relationship between the size of habitat patches and warbler demographics such as presence and abundance within the patch. Coldren (1998) and Baccus et al. (2007) have found that GCWA abundance increases and territory size decreases linearly with patch size. Further,

research indicates pairing and territory success both correlate positively to patch size. Patches of suitable oak-juniper habitat exceeding 100 hectares (ha) (247 acres) are considered prime habitat (Arnold et al. 1996; Coldren 1998; Butcher et al. 2010; Morrison et al. 2010). Specifically, Arnold et al. (1996) found warblers were not reliably found in patches smaller than 57 acres (23 ha) and Butcher et al. (2010) suggest patch sizes ranging from 37–68 acres (15–27.7 ha) to be minimums for reproductive success. In addition to patch size, the amount of mature mixed woodland in the landscape is considered to be the most important predictive landscape-scale variable to GCWA occurrence (Magness et al. 2006).

GCWA Life History

The GCWA was discovered and first collected by Osbert Salvin in Guatemala in 1859 and later described by Philip Lutley Sclater of the British Museum and Salvin in 1860 (Pulich 1976; USFWS 1990; Groce et al. 2010). The first Texas specimen collected was in 1864 near the confluence of the Medina and San Antonio Rivers in Bexar County, Texas, and the first GCWA nest was found in 1878 in Comal County. The GCWA was federally listed as an endangered species on May 4, 1990, by means of emergency rule. The final rule listing the GCWA as endangered under the ESA was published on December 27, 1990 (Pulich 1976; USFWS 1992; Groce et al. 2010). In February 1991, the species was designated as endangered by the State of Texas (USFWS 1992). Critical habitat for the GCWA has not been designated.

The GCWA winters in southern Mexico (State of Chiapas) and in the Central American countries of Guatemala, Honduras, and Nicaragua (USFWS 1992). The species breeds only in the mixed Ashe juniper–oak woodlands of Central Texas. Of all the avian species known to occur in Texas, the GCWA is the only species whose breeding range is completely limited to the state. The GCWA generally begins to arrive on the breeding grounds in central Texas in late February and early March. The migration route of the GCWA follows the coniferous-oak highlands of the Sierra Madre Oriental (NatureServe 2012). The majority of the adults and fledglings leave the breeding grounds and begin the southward migration back to the subtropics in late June to July.

The GCWA is an insectivorous hopping and gleaning species, consuming lepidopteran larvae and non-lepidopteran winged insects (Groce et al. 2010) with beetles, caterpillars, Homopterans, Hemipterans, and spiders being their most common prey items (USFWS 1992). Much of the foraging time of the GCWA on the breeding grounds is spent gleaning for insects by moving from branch to branch within the upper portions of the woodland canopy; particularly in oaks (USFWS 1992; Groce et al. 2010).

GCWA Population Dynamics

Pulich (1976) considered 31 counties located in Texas to be the nesting range of the GCWA: Bandera, Bell, Bexar, Blanco, Edwards, Erath, Comal, Coryell, Eastland, Bosque, Burnet, Gillespie, Hamilton, Hays, Hood, Johnson, Kendall, Kerr, Kimble, Kinney, Lampasas, Llano, Medina, Palo Pinto, Real, San Saba, Somervell, Stephens, Travis, Uvalde, and Williamson. He estimated the entire GCWA population in 1974 to be between 15,000 and 17,000 individuals (*Federal Register* 55, 53153–53160). In 1990, suitable habitat for the species was estimated throughout both urban and rural sections of Texas, and based on available breeding habitat, it was determined that Texas could only support 4,800 to 16,000 breeding pairs (USFWS 1990). It was estimated that only 2,200 to 4,600 breeding pairs remained in 1990

(NatureServe 2012). Morrison et al. (2010) reported range wide presence of 4,148,138 acres of potential GCWA habitat in 63,616 patches; the majority of which were less than 25 acres in size. Mean patch size was greatest in USFWS Recovery Regions 5, 6 and 8. The US 281 project area falls within GCWA recovery Region 6, which includes all or portions of Bexar, Bandera, Kerr, Kendall, Gillespie, Blanco, and Comal Counties. Using these habitat quantities and random point counts of singing males within habitat patches across the range, Morrison et al. (2010) estimated there were between 175,000 and 265,000 (mean = 220,000) adult male warblers in Texas in 2009. Further, they estimated anywhere from >370,000 to 300,000 total birds present in Texas, assuming 70 percent pairing success. The authors state that it is important to note that this range wide abundance estimate is an inferred or extrapolated number based upon GIS habitat estimates and point count verifications of occupancy (Morrison et al. 2010).

The 2006 range map published by the Texas Parks and Wildlife Department (TPWD) shows the GCWA as having a potential or known presence in 44 counties in Texas. Currently, the USFWS distribution map for the GCWA shows the species as being present in 37 counties in Texas on the Lampasas Cut Plain, the Edwards Plateau, and the Llano Uplift regions of Texas. The largest concentration of GCWAs is located in the Balcones Fault Zone (USFWS 1992). Numerous state and federal properties totaling over 126,000 acres are within the breeding range of the GCWA. These include parks, natural areas, and recreation areas owned by the State of Texas and military reservations, areas surrounding lakes and a national wildlife refuge owned by the federal government (USFWS 1992). Of the 29 properties owned by the state or federal government within the range of the GCWA, 16 have the GCWA present. In addition, other entities such as the Lower Colorado River Authority, counties (Bexar, Travis, Williamson, and Hays), and local municipalities such as the City of San Antonio also own property occupied by and/or managed for the GCWA (USFWS 1992).

GCWA Breeding/Reproduction

Researchers have found a wide variety in breeding territory sizes for the GCWA. Depending on the location and quality of habitat, GCWAs forage and nest in areas ranging in size from 5 to 20 acres per pair and males often return to the same nesting territory in subsequent years (USFWS 1992). Other Travis County studies have yielded territory sizes ranging from roughly 7 to 57 acres in size to 1 to 7 acres in size (Groce et al. 2010). It is important to note that, although territories are relatively small in size, recent studies indicate that much larger patch sizes are necessary for reliable occurrence (57 acres) and reproductive success (37–68 acres) (Arnold et al. 1996 and Butcher et al. 2010).

Female GCWAs begin building nests the first week of April. The nests consist of bark from the Ashe juniper tree that is secured by cobwebs and lined with feathers, grass, oak leaves, etc. When finished, the nest is a small, compact cup averaging 80 millimeters outside diameter and 50 millimeters outside depth (USFWS 1992). Pulich (1976) found that females usually place the nest in the upper two-thirds of Ashe juniper trees. While juniper trees are the most common tree used as nesting sites, the species has also been found to place their nests in cedar elms, various oaks, pecans, and other species (USFWS 1992). The female GCWA will perform all duties associated with incubation, which begins on the day before the last egg is laid and lasts 12 days. The female spends at least 75 percent of daylight hours on the nest (USFWS 1992).

Reasons for Listing GCWA and Current Threats

Historically, habitat loss and fragmentation were the major reasons for the decline in the GCWA population. A juniper eradication program was implemented in Texas in 1948, and from the 1950s to the 1970s, about 50 percent of the juniper acreage was cleared for pasture improvement and urbanization (USFWS 1990). Several counties that had GCWA habitat, including portions of Gillespie County and all of Mason County, no longer contained suitable habitat by the 1970s (USFWS 1990). The current threat to the Ashe juniper-oak woodland is urban sprawl, growth of urban areas with known GCWA populations such as the city of Austin, and the conversion of wooded areas to agricultural land. In 1992, 60 percent of the remaining warbler habitat was located in the fastest urbanizing counties of Texas such as Travis, Bexar, and Kerr (Sexton 1992). Because of the growth and development in this corridor, the greatest rate of GCWA habitat loss has occurred in the southern and eastern portions of the Edwards Plateau (USFWS 1990). According to the GCWA recovery plan other major threats to the species include the creation of impoundments for flood control and livestock, loss of winter and migration habitat, destruction of oaks by oak wilt, over-browsing by livestock and white-tailed deer, nest parasitism, and habitat fragmentation (USFWS 1992).

3.0 PRE-FIELD PREPARATION, HABITAT ASSESSMENT AND SURVEY METHODOLOGY

3.1 Habitat Determinations

The primary pre-field preparation for this survey was a review of the survey report by B&A, recent aerial photography, topographic maps and field reconnaissance. Right of entry was requested for all parcels within the habitat blocks identified by B&A. The habitat assessment conducted during 2009 originally delineated 13 blocks of potential habitat for the GCWA (B&A 2009). However, after the 2009 survey, blocks 4, 10, and 11 were dismissed as potential habitat due to a variety of reasons, primarily the removal of Ashe juniper and residential and commercial development within these areas. 2010 surveys resulted in further dismissal of blocks or portions of blocks as potential habitat due to similar reasons. On March 14, 2014, prior to the commencement of 2014 surveys, a field visit was conducted to reassess the habitat blocks. Approximately 32.14 acres of potential GCWA habitat was identified on the north end of the project limits and were included in Block 2. Clearing of Ashe juniper was noted in Block 9. **Table 1** below provides 2010 and 2014 summary information regarding parcels, acreages and habitat suitability for each of the original 13 habitat blocks.

Table 1. US 281 (Borgfeld Drive – Loop 1604) GCWA Habitat Block Summary – 2010 Survey						
Habitat Block	# of Parcels Directly Surveyed		Acreage Directly Surveyed		Habitat Suitability/Disposition	
	2010	2014	2010	2014	2010	2014
1	2		15.86	23.55	Suitable for survey	Suitable for survey
2	2		14.14	55.77	Suitable for survey	Suitable for survey
3	0		0	0.27	No response to right of entry (ROE) requests	Suitable for survey
4	0		0	0	Dismissed by B&A (residential in nature)	Dismissed by B&A (residential in nature)
5	0		0	3.88	No response and/or denial to ROE letters	Suitable for survey
6	2		11.78	8.94	13 acres dismissed by H&C due to complete Ashe juniper removal; remainder suitable for survey	Suitable for survey
7	1		4.92	10.16	Suitable for survey	Suitable for survey
8	0		0	4.14	ROE problematic (late, conditional – unreasonable insurance requirements)	Suitable for survey
9	11		77.26	12.43	Suitable for survey but significant oak die-off occurring due to stress-induced hypoxylon canker	Suitable for survey but Ashe juniper removal noted
10	0		0	0	Dismissed by B&A (surrounded by commercial development); No ROE granted	Dismissed by B&A (complete Ashe juniper removal); No ROE granted
11	0		0	0	Dismissed by B&A (complete Ashe juniper removal); No ROE granted	Dismissed by B&A (complete Ashe juniper removal)
12	0		0	0	42.43 acres dismissed by H&C due to complete Ashe juniper removal	Dismissed by Hicks during 2010 survey due to complete Ashe juniper removal
13	0		0	5.74	No response to ROE requests	Suitable for survey
Totals:	18		123.98	124.88		

3.2 Presence/Absence Surveys

Presence/absence surveys for the GCWA were performed on all the habitat areas delineated during the habitat determination and followed the procedures outlined in the 2009 USFWS GCWA survey protocol and the stipulations detailed in our 10(a)(1)(A) Scientific Permit requirements. GCWA surveys were conducted between March 15 and May 31. Five visits were made to each parcel, with no more than one visit within a five-day period. A sixth visit utilizing play-back tapes was conducted to confirm absence. Surveys were conducted during favorable weather conditions and lasted at least five hours for the 125 acres of potential habitat. A total of 54 properties within nine of the 13 original habitat blocks granted

access to conduct surveys. Of these, 47 were within the habitat blocks deemed suitable for survey (blocks 1–3, 5–9, and 13). Areas where right of entry was granted were accessed on foot and, where possible, areas that were not granted right of entry were surveyed from the existing right of way. Copies of the GCWA presence/absence field data forms, which include data on the weather conditions during the surveys, are included in **Attachment 3**.

5.0 GOLDEN-CHEEKED WARBLER SURVEY RESULTS AND DISCUSSION

A total of six survey visits were made by ecologists familiar with GCWA habitat, calls, and behavior. As shown below on **Table 2**, approximately 54.27 person hours were expended in the survey effort. A USFWS and TPWD permitted staff member was present during each of these visits. The Spring 2014 survey efforts resulted in no documentation of GCWAs or territories within the study area. A sixth visit utilizing play-back calls confirmed the absence of this species within the survey area.

Table 2. US 281 Golden-cheeked Warbler Survey Effort			
Date of Survey	Observers	Hours Surveyed/Observer	Total Person Hours
3/28/2014	Julie LeClair	7.00	7.00
4/4/2014	John Kuhl	7.00	7.00
4/17/2014	John Kuhl, Julie LeClair	4.75	9.5
4/25/2014	John Kuhl, Julie LeClair	5.22	10.44
5/09/2014	John Kuhl, Julie LeClair	4.50	9.00
5/22/2014	John Kuhl, Julie LeClair	5.66	11.33
Total			54.27

Forty-five other avian species, representing 24 families, were detected during the survey. A list of the avian species and other wildlife documented in the study area during the 2014 survey is provided in **Attachment 4**. Other wildlife species observed during the survey included northern cricket frog (*Acris crepitans*), southern leopard frog (*Rana sphenocephala*), Texas spiny lizard (*Sceloperus olivaceus*), green anole (*Anolis carolinensis*), eastern cottontail (*Sylvilagus floridanus*), rock squirrel (*Spermophilus variegatus*), fox squirrel (*Sciurius niger*), raccoon (*Procyon lotor*) and white-tailed deer (*Odocoileus virginiana*).

6.0 SUMMARY

A previous habitat assessment by B&A found no GCWA habitat in the existing US 281 ROW but identified 13 blocks of potential GCWA habitat in either proposed ROW and/or a 500-foot wide corridor on either side of the proposed ROW. B&A recommended dismissal of blocks 4, 10, and 11 due to surrounding development and/or habitat removal (removal of all Ashe junipers). H&C ecologists agreed with these findings and dismissed a portion of Block 6 and all of Block 12 due to habitat removal which occurred prior to the 2010 survey. A field visit conducted prior to the commencement of 2014 surveys resulted in the addition of approximately 32.14 acres of potential habitat to Block 2 on the north end of

the project limits. Additionally, Ashe juniper clearing was noted in Block 9. During the 2014 breeding season, a rigorous direct survey was conducted on approximately 125 acres in blocks 1–3, 5–9, and 13 and surveyors checked all additional habitat available from public rights of way during the effort. After three years worth of effort, no GCWA have been detected and habitat quantity and quality losses continue due to current and pending development and both man-induced and natural woodland losses in the corridor. Ashe juniper clearing has taken place in blocks 6, 9, 11, and 12 and significant oak mortality has been observed on the west side of US 281 due to hypoxylon canker; a naturally occurring fungal condition particularly expressed in oaks during periods of environmental stress. In addition, nesting deterrents for the GCWA are prevalent and likely increasing due to urbanization, noise, and the prevalence of typical nest predator and social parasite species such as the Western Scrub Jay, Great-tailed Grackle and Brown-headed Cowbird. Given the negative survey findings to date and increasing downward spiral of habitat quality, it does not seem likely that the GCWA will utilize the project corridor.

7.0 LITERATURE CITED

- Arnold, K.A., C.L. Coldren, and M.L. Fink. 1996. The interactions between avian predators and golden-cheeked warblers in Travis County. Texas Transportation Institute. Texas A&M University System. Texas Department of Transportation. Report 1983-2. College Station, Texas, USA.
- Baccus, J.T., M.E. Tolle, and J.D. Cornelius. 2007. Response of golden-cheeked warblers (*Dendroica chrysoparia*) to wildfires at Fort Hood, Texas. Texas Ornithological Society.
- Blanton & Associates, Inc. 2009. Habitat Assessments for the golden-cheeked warbler and black-capped vireo and presence-absence surveys for the golden-cheeked warbler within the study area of the Alamo Regional Mobility Authority's proposed improvements to US 281 from Borgfeld Road to Loop 1604 in Bexar County, Texas.
- Butcher, J.A., M.L. Morrison, D. Ransom, R.D. Slack and R.N. Wilkins. 2010. Evidence of a minimum patch size threshold of reproductive success in an endangered songbird. *Journal of Wildlife Management* 74(1): 133-139.
- Campbell, L. 2003. Endangered and threatened animals of Texas: their life history and management. Texas Parks and Wildlife Department, Austin, Texas.
- Coldren, C.L. 1998. The effects of habitat fragmentation on the golden-cheeked warbler. Dissertation, Texas A&M University, College Station.
- Federal Register*, <http://www.gpoaccess.gov/fr/index.html>, 1994–2007
- Gould, F.W., G.O. Hoffman, and C.A. Rechenstien. 1960. Vegetational Areas of Texas. Texas A&M University, Texas Agricultural Experiment Station Leaflet No. 492.
- Groce, J.E., H.A. Mathewson, M.L. Morrison and N. Wilkins. 2010. Scientific evaluation for the 5-year status review of the golden-cheeked warbler. Prepared for the U.S. Fish and Wildlife Service by the Institute of Renewable Natural Resources and Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station.
- Guilfoyle, M.P. 2002. Black-capped vireo and golden-cheeked warbler populations potentially impacted by USACE reservoir operations. EMRRP Technical Notes Collection (TNEMRRP-S1-28). U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.
- Hicks & Company. 2010. Golden-cheeked Warbler Survey – Alamo Regional Mobility Authority's Proposed Improvements to US 281 (Borgfeld Road to Loop 1604 – Bexar County, Texas).
- Klassen, J.A. 2011. Canopy characteristics affecting avian reproductive success: the golden-cheeked warbler. Thesis submitted to the Office of Graduate Studies of Texas A&M University, College Station.

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- Kroll, J.C. 1980. Habitat requirements of the golden-cheeked warbler: management implications. *Journal of Range Management* 33(1): 60–65.
- Ladd, C.G. 1985. Nesting habitat requirements of the Golden-cheeked warbler. Master's thesis, Southwest Texas State University, San Marcos.
- Ladd, C., and Gass, L. 1999. Golden-cheeked warbler (*Dendroica chrysoparia*). *The Birds of North America*, No. 420. A. Poole and F. Gill, eds. *The Birds of North America*, Inc., Philadelphia, Pennsylvania.
- Magness, D.R., R.N. Wilkins, and S.J. Hejl. 2006. Quantitative relationships among golden-cheeked warbler occurrence and landscape size, composition, and structure. *Wildlife Society Bulletin* 34:473–479
- McMahan, C.A., R.G. Frye, and K.L. Brown, 1984. *The vegetation types of Texas*. Texas Parks and Wildlife Department, Austin.
- Morrison, M.L., R.N. Wilkins, B.A. Collier, J.E. Groce, H.A. Mathewson, T.M. McFarland, A.G. Snelgrove, R.T. Snelgrove, and K.L. Skow. 2010. *Golden-Cheeked Warbler Population Distribution and Abundance*. Texas A&M Institute of Renewable Natural Resources, College Station.
- NatureServe. 2012. NatureServe Explorer: An Online Encyclopedia of Life. <http://www.natureserve.org/explorer> (accessed June 12, 2012).
- Pulich, W.M. Sr. 1976. *The golden-cheeked warbler: a bioecological study*. Texas Parks and Wildlife Department, Austin.
- Sexton, C. 1992. The golden-cheeked warbler. *Birding*. December 1992:373–6.
- U.S. Department of Agriculture-Soil Conservation Service (NRCS). 1984. *Web Soil Survey*. Hays County, Texas. Accessed May 22, 2013.
- U.S. Fish and Wildlife Service (USFWS). 1990. Final Rule to List the Golden-cheeked Warbler as Endangered. *Federal Register* 55, 53153–53160.
- . 1992. *Golden-cheeked Warbler (Dendroica chrysoparia) Recovery Plan*. Albuquerque, New Mexico.

ATTACHMENT 1

FIGURES

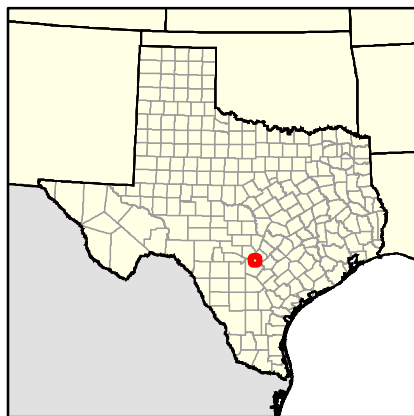
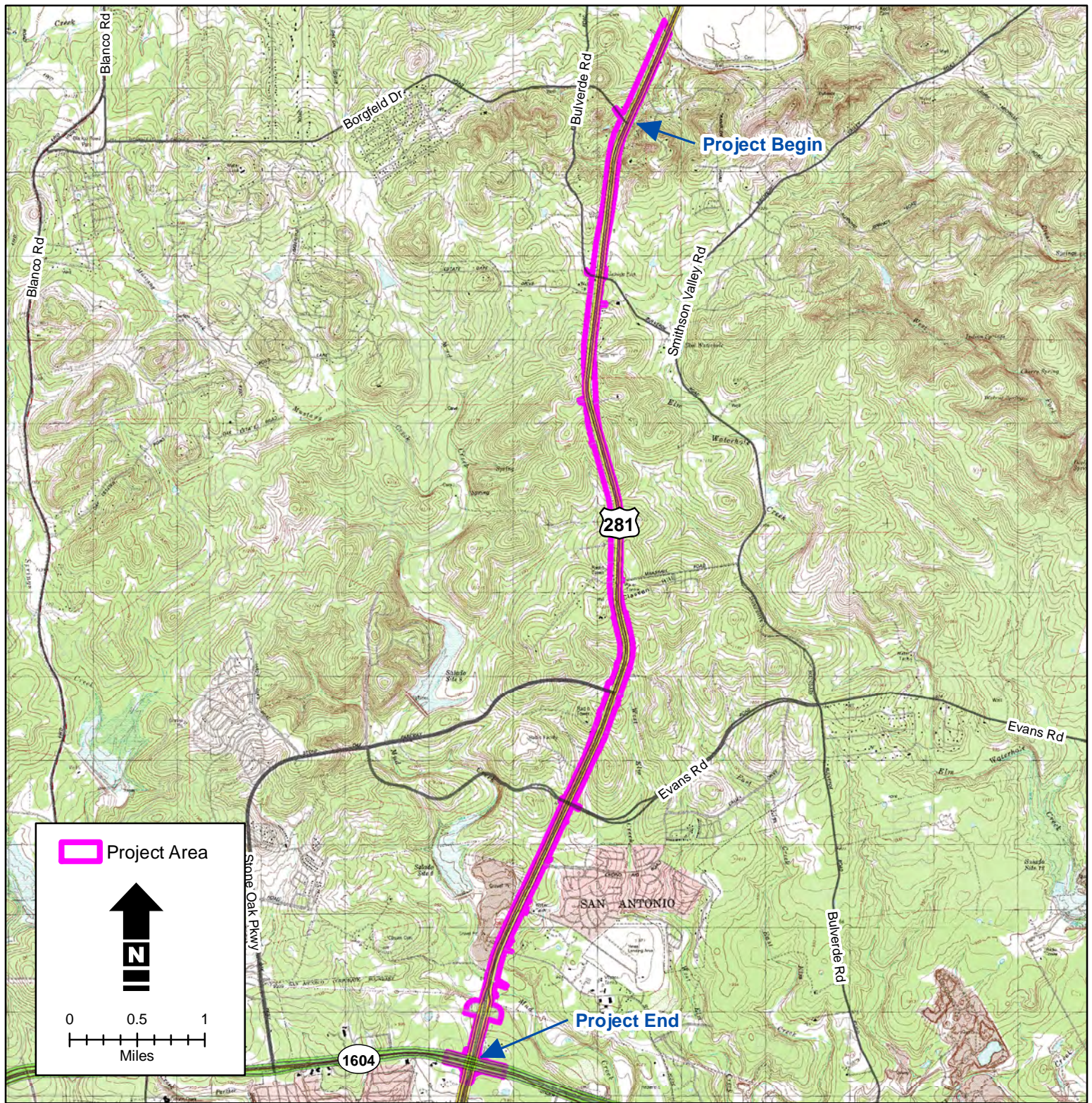
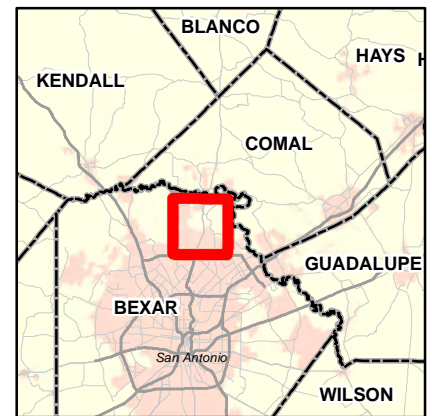


Figure 1
Project Location
US 281 From Loop 1604 to Borgfeld Drive
Bexar County, TX

USGS 7.5-minute Topographic Quadrangles:
 Bulverde, Longhorn, Camp Bullis & Castle Hills, Tx



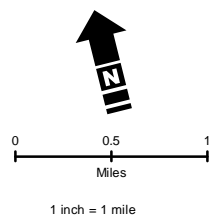
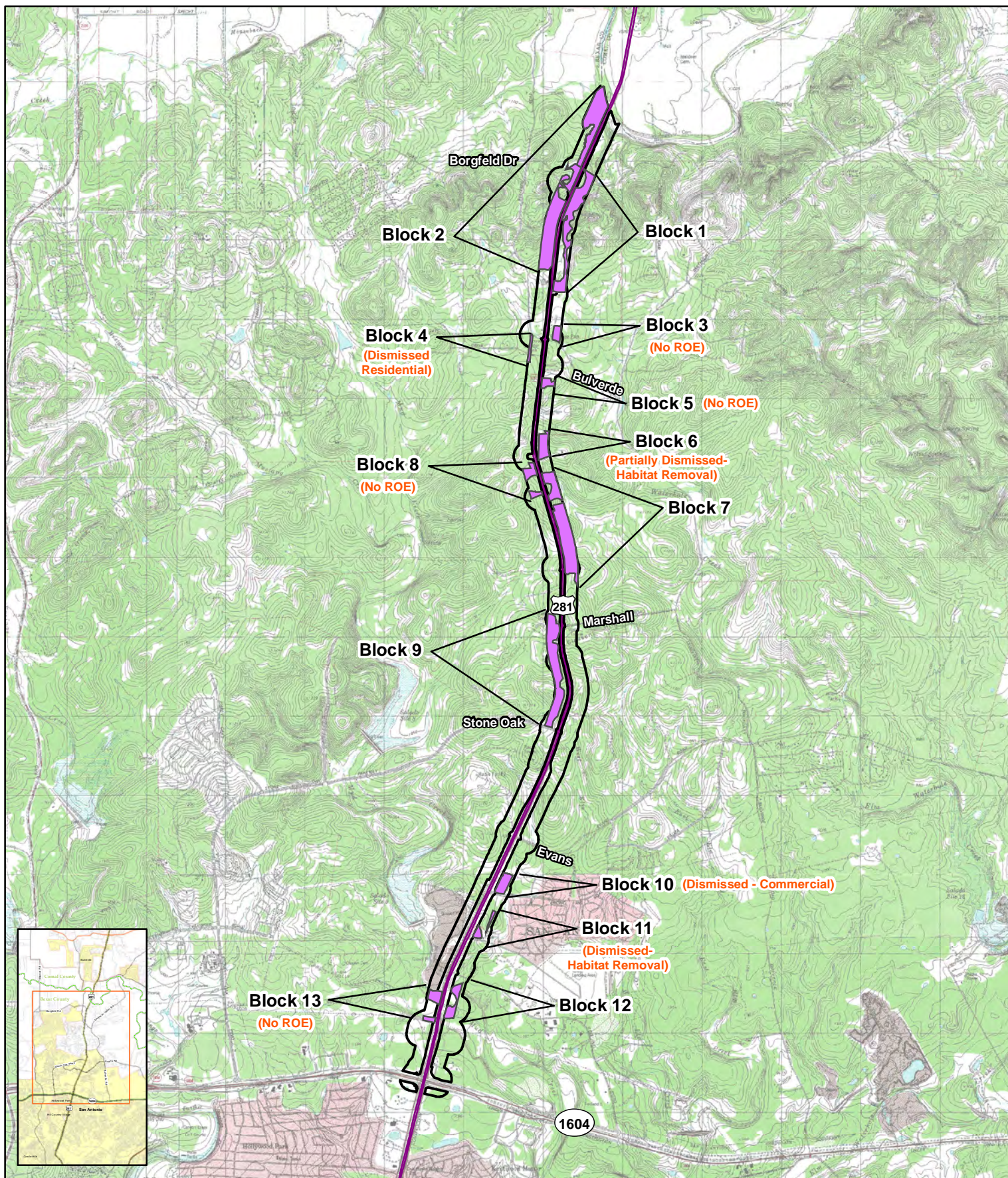


Figure 2
US 281 From Loop 1604 to Borgfeld Drive
Potential GCWA Habitat Blocks
on Topographic Base

Key to Features

- Study Area (500 ft. Buffer from Proposed ROW)
- Golden-cheeked Warbler Habitat Blocks

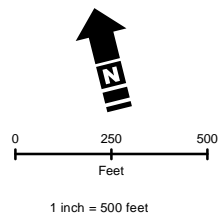
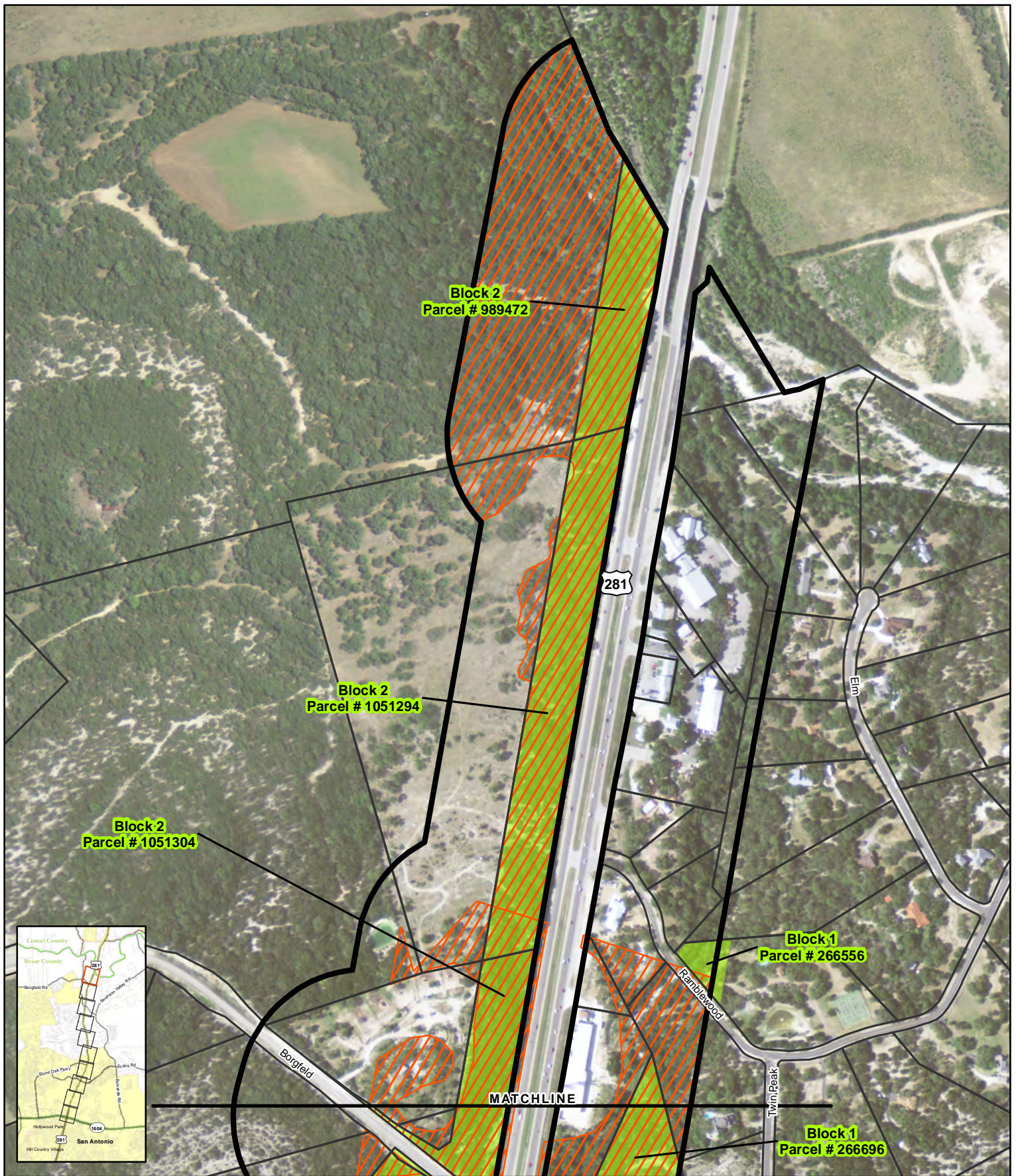


Figure 3.1
 US 281 From Loop 1604 to Borgfeld Drive
 Potential GCWA Habitat Blocks
 and Right of Entry Status

Key to Features

- | | |
|---|--------------------------------|
| Parcel Boundaries | Golden-cheeked Warbler Habitat |
| Study Area (500 ft. Buffer from Proposed ROW) | Right of Entry Granted |

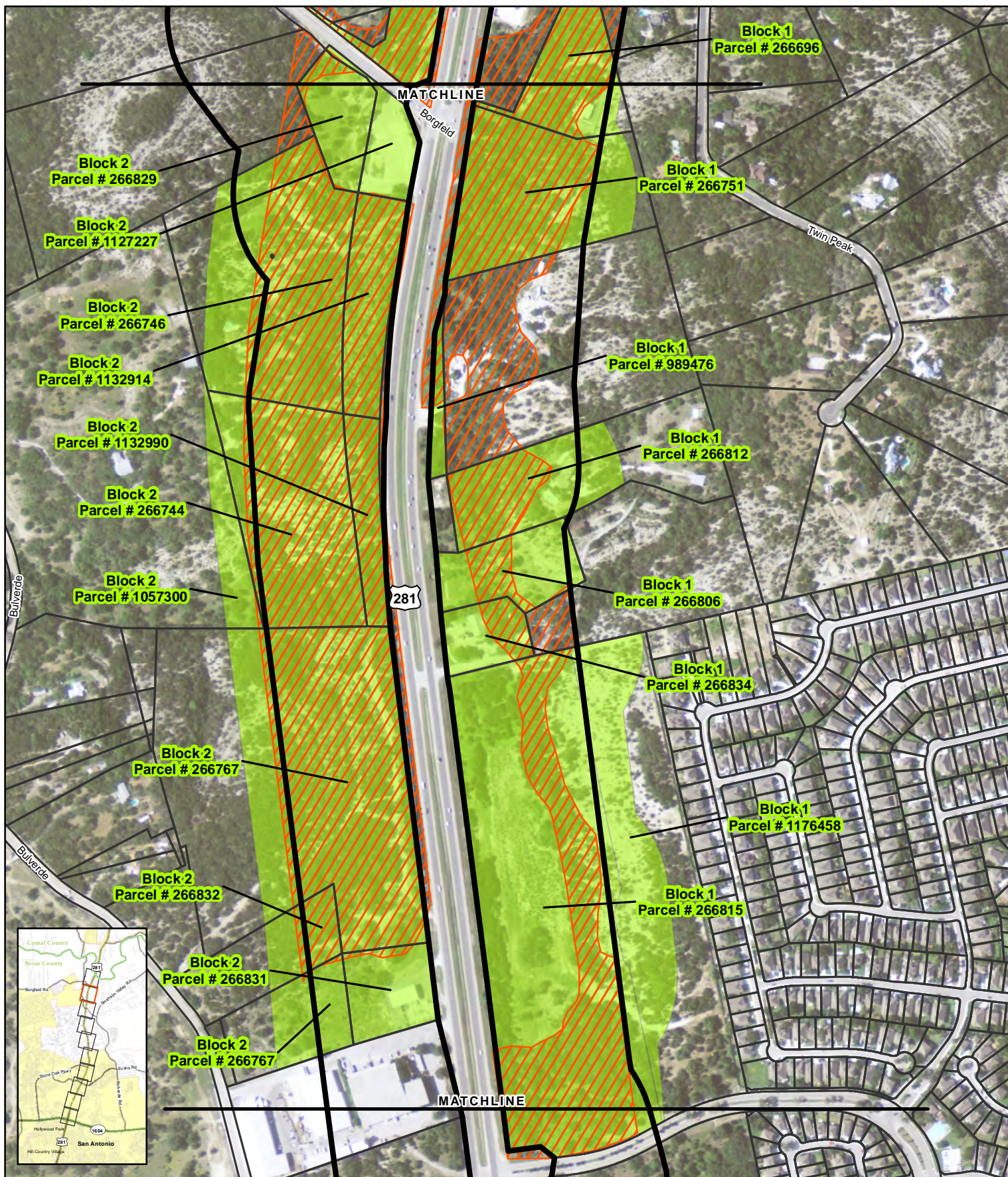


Figure 3.2
US 281 From Loop 1604 to Borgfeld Drive
Potential GCWA Habitat Blocks
and Right of Entry Status

Key to Features

- Parcel Boundaries
- Study Area
(500 ft. Buffer from Proposed ROW)
- Golden-cheeked Warbler Habitat
- Right of Entry Granted

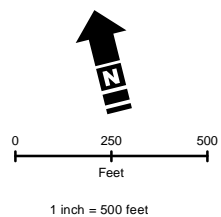
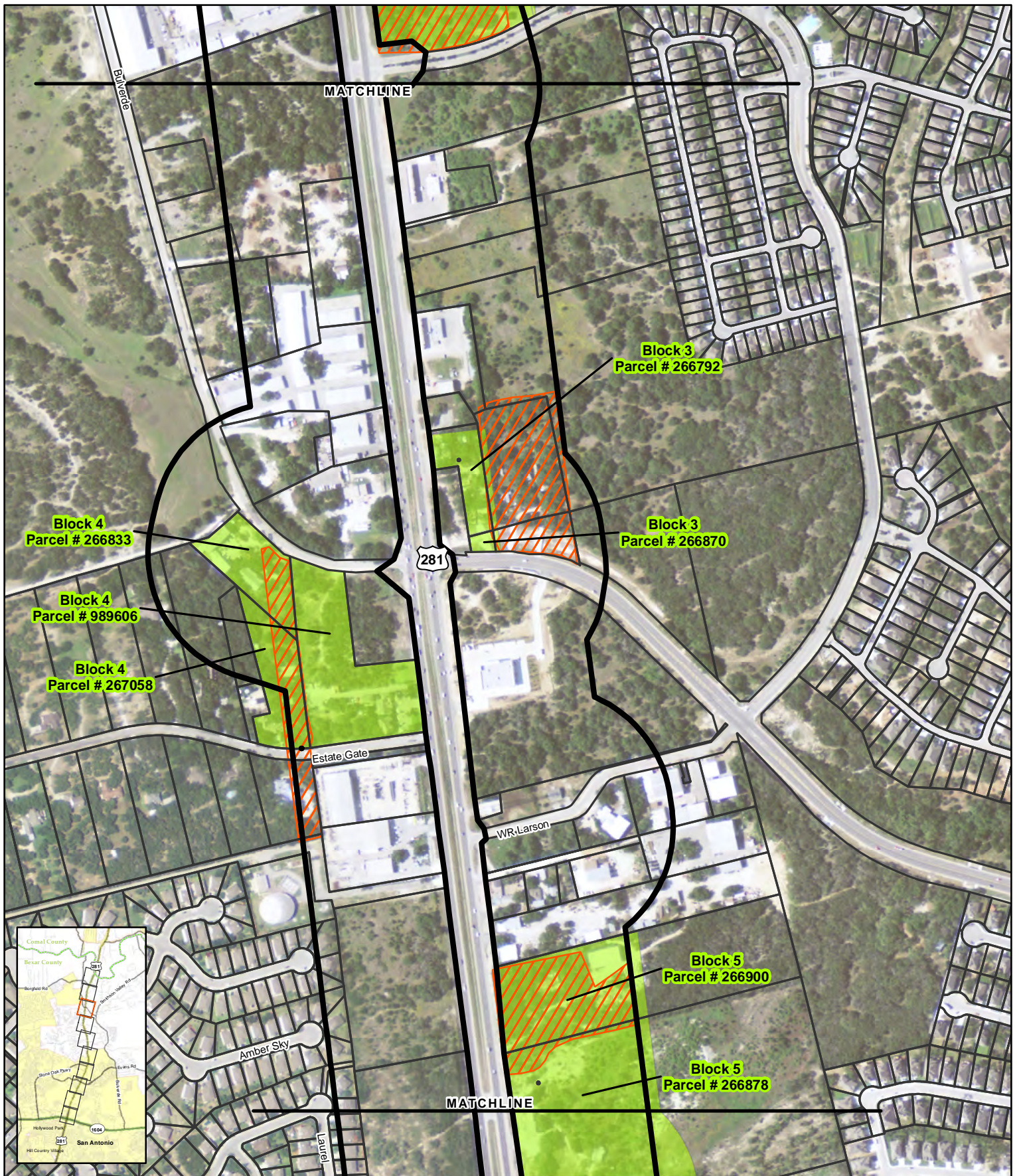


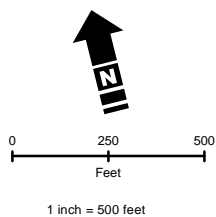
Figure 3.3
 US 281 From Loop 1604 to Borgfeld Drive
 Potential GCWA Habitat Blocks
 and Right of Entry Status

Key to Features

- | | |
|---|--------------------------------|
| Parcel Boundaries | Golden-cheeked Warbler Habitat |
| Study Area (500 ft. Buffer from Proposed ROW) | Right of Entry Granted |



Figure 3.4
US 281 From Loop 1604 to Borgfeld Drive
Potential GCWA Habitat Blocks
and Right of Entry Status



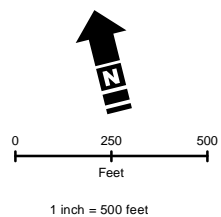
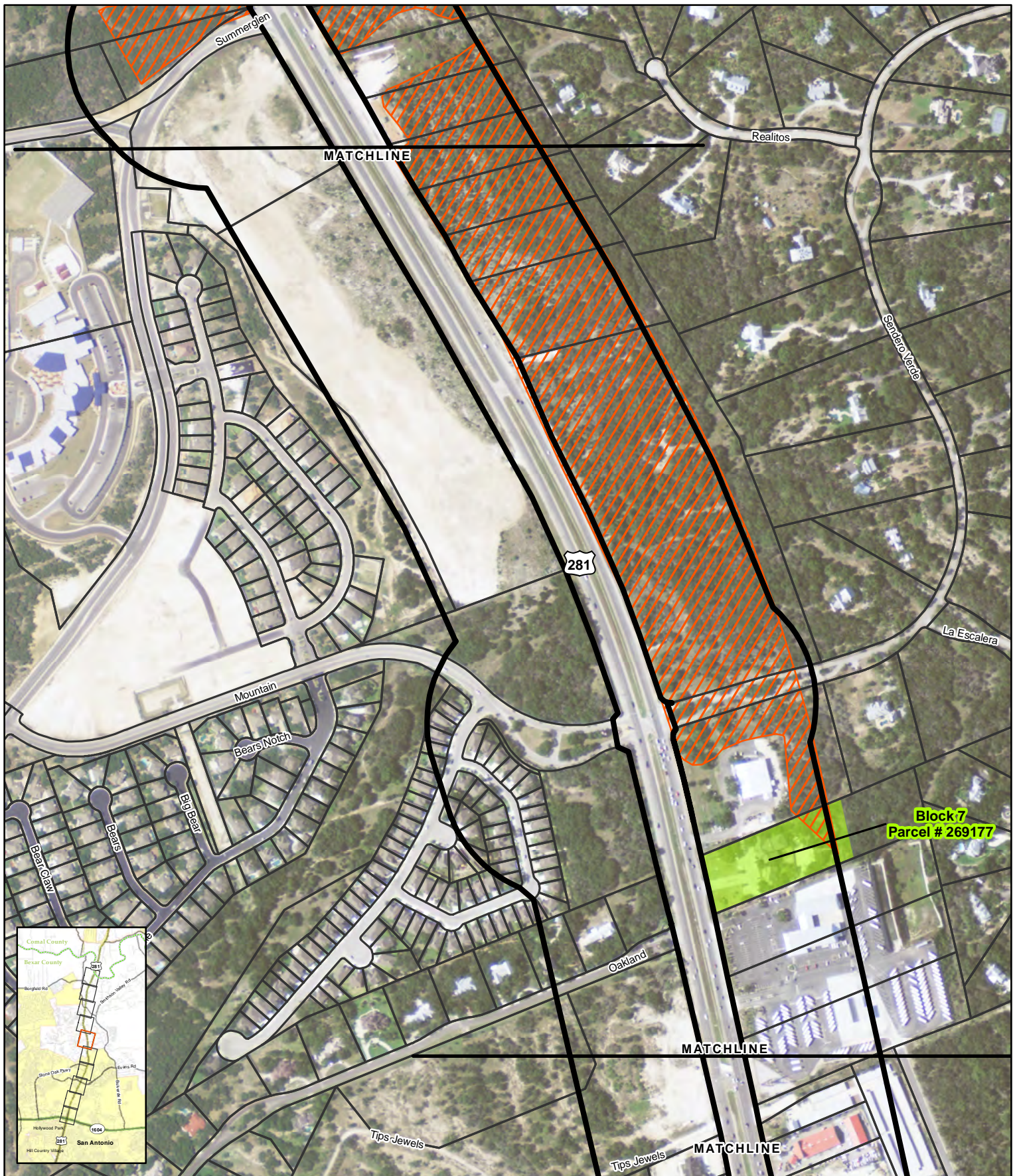


Figure 3.5
 US 281 From Loop 1604 to Borgfeld Drive
 Potential GCWA Habitat Blocks
 and Right of Entry Status

Key to Features

- | | |
|---|--------------------------------|
| Parcel Boundaries | Golden-cheeked Warbler Habitat |
| Study Area (500 ft. Buffer from Proposed ROW) | Right of Entry Granted |

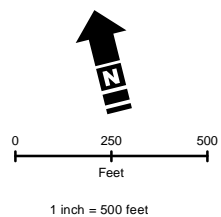
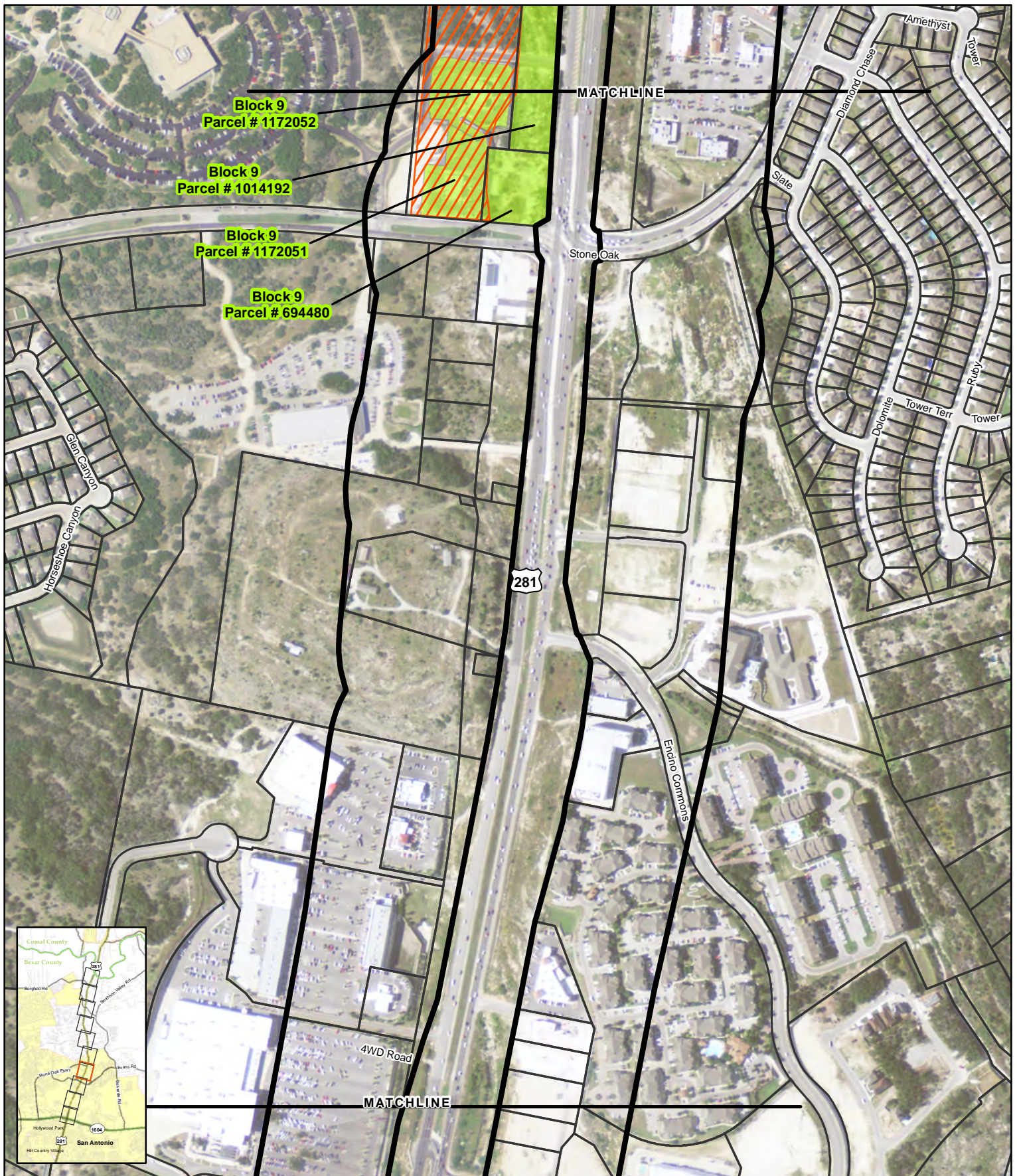


Figure 3.7
 US 281 From Loop 1604 to Borgfeld Drive
 Potential GCWA Habitat Blocks
 and Right of Entry Status

Key to Features

- | | |
|---|--------------------------------|
| Parcel Boundaries | Golden-cheeked Warbler Habitat |
| Study Area (500 ft. Buffer from Proposed ROW) | Right of Entry Granted |

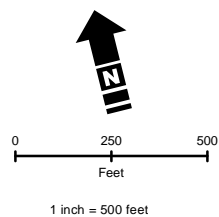
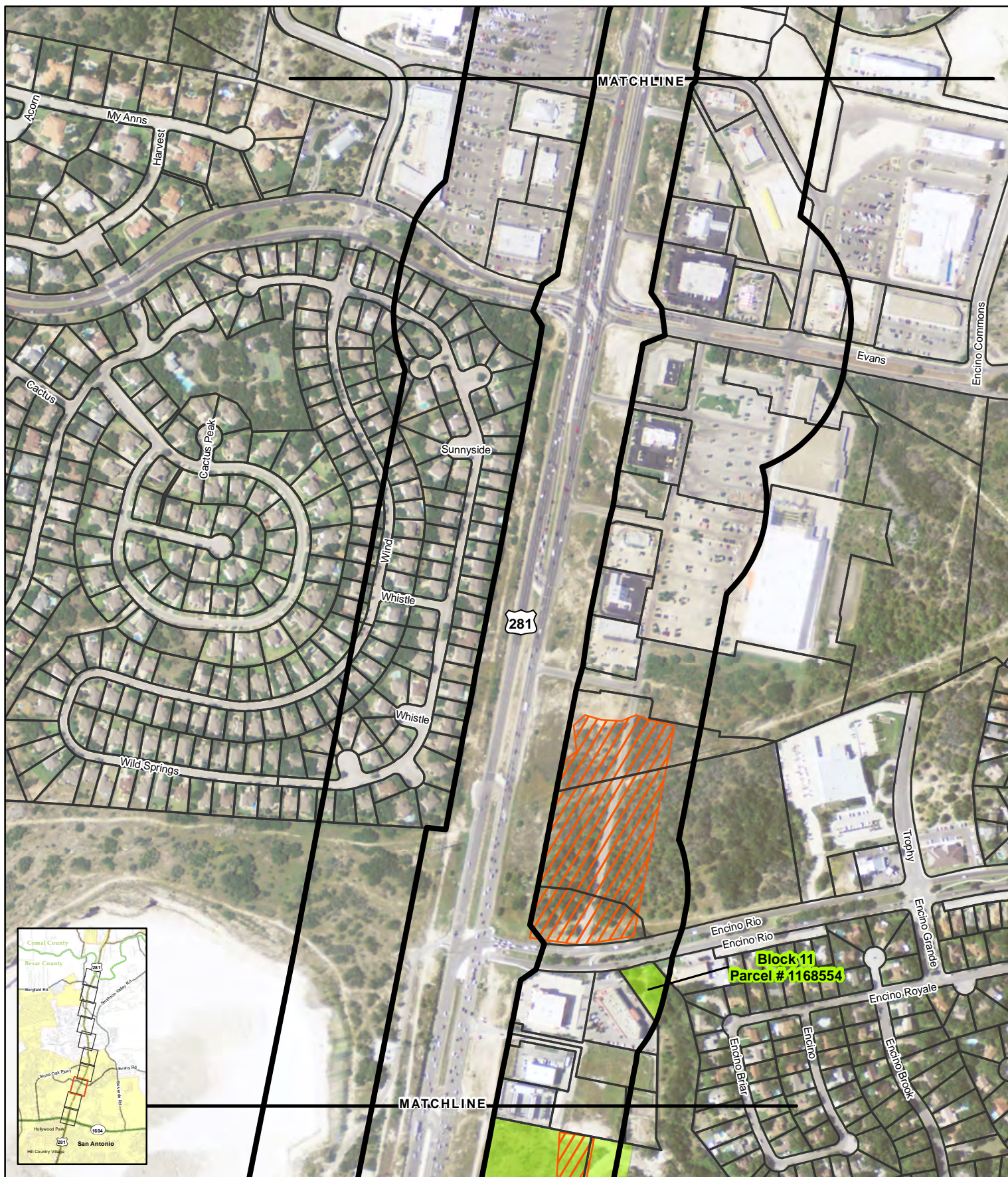


Figure 3.8
US 281 From Loop 1604 to Borgfeld Drive
Potential GCWA Habitat Blocks
and Right of Entry Status

Key to Features

- | | |
|---|--------------------------------|
| Parcel Boundaries | Golden-cheeked Warbler Habitat |
| Study Area (500 ft. Buffer from Proposed ROW) | Right of Entry Granted |

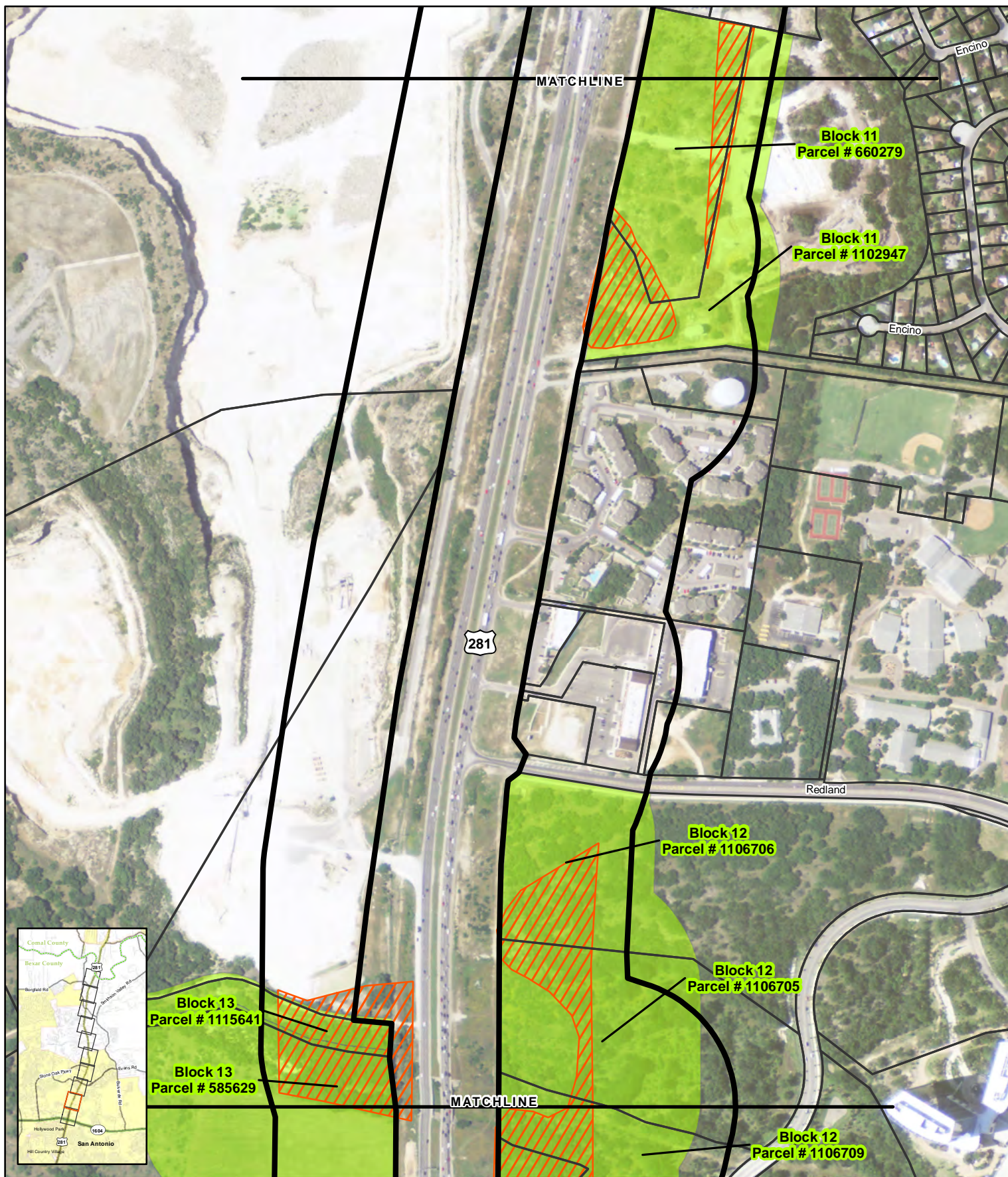
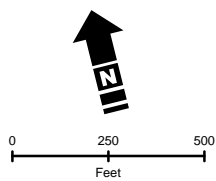


Figure 3.9
 US 281 From Loop 1604 to Borgfeld Drive
 Potential GCWA Habitat Blocks
 and Right of Entry Status

Key to Features

- Parcel Boundaries
- Study Area
(500 ft. Buffer from Proposed ROW)
- Golden-cheeked Warbler Habitat
- Right of Entry Granted



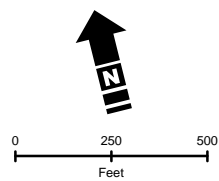
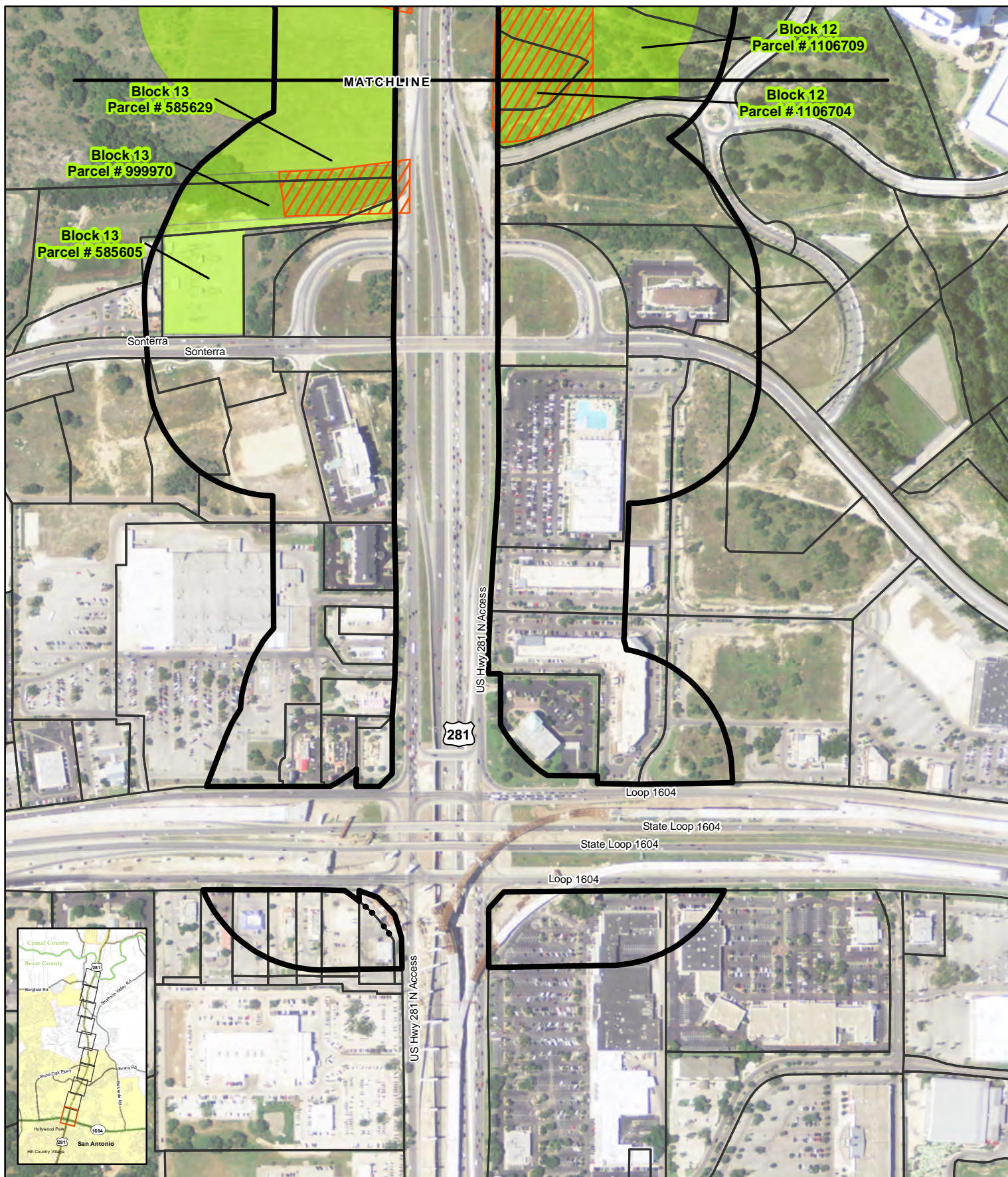


Figure 3.10
US 281 From Loop 1604 to Borgfeld Drive
Potential GCWA Habitat Blocks
and Right of Entry Status

Key to Features

- Parcel Boundaries
- Study Area
(500 ft. Buffer
from Proposed ROW)
- Golden-cheeked
Warbler Habitat
- Right of Entry
Granted

ATTACHMENT 2

SITE PHOTOS



Photo 1. View of potential habitat added to Block 2, south of Cibolo Creek, looking north



Photo 2. View of potential habitat west of US 281, south of Borgfeld Drive, looking north



Photo 3. View of potential habitat east of US 281, south of Celebration Drive, looking east



Photo 4. View of potential habitat east of US 281, south of Ramblewood Street, looking north



Photo 6. View of Ashe juniper clearing in Block 9, looking west

ATTACHMENT 3

SURVEY DATA FORMS

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

[illegible]

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

[illegible]

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

Study Site	Weather Conditions		
Tract #	Begin	End	
Visit #	Temperature		
Date	Cloud Cover		
Observer	Precipitation		
Time Begin-End	Wind Speed/Direction		
General Survey Notes (e.g., Additional wildlife information, etc.)			

BLVV	BCHW	RCKI	SUTH	
RTHA	WEVI	NOMO	NOCA	
CRCA	BCTI	NAWA	GTER	DELV
MODU	CARW	RCSY	BHCO	Rock Squirrel
GIRKO	BEWR	CHSY	HOFT	Fox Squirrel
				Raccoon scat
				cricket frog

[illegible]

Bird Observation Notes – (Age (HY, SY, ASY), behavior observed, etc.)

NO GCWA detected

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

[illegible]

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

[illegible]

GOLDEN-CHEEKED WARBLER/ BLACK-CAPPED VIREO FIELD DATA FORM

[illegible]

ATTACHMENT 4

AVIAN AND OTHER WILDLIFE SPECIES DETECTED

**Golden-cheeked Warbler Survey
US 281 in Bexar County, Texas**

Other Wildlife Species Detected US 281 2014 GCWA Survey Species Identification*			
Family (Subfamily)	Scientific Name	Common Name	Code
AMPHIBIANS			
Hylidae (Hylinae)	<i>Acris crepitans</i>	Northern cricket frog	
Ranidae	<i>Rana sphenoccephala</i>	Southern leopard frog	
REPTILES			
Phrynosomatidae	<i>Sceloporus olivaceus</i>	Texas spiny lizard	
Polychrotidae	<i>Anolis carolinensis</i>	Green anole	
BIRDS			
Anatidae	<i>Dendrocygna autumnalis</i>	Black-bellied Whistling-Duck	BBWD
Cathartidae	<i>Coragyps altratus</i>	Black Vulture	BLVU
Cathartidae	<i>Cathartes aura</i>	Turkey Vulture	TUVU
Accipitridae (Accipitrinae)	<i>Buteo jamaicensis</i>	Red-tailed Hawk	RTHA
Falconidae (Caracarinae)	<i>Caracara cheriway</i>	Crested Caracara	CRCA
Columbidae	<i>Zenaida asiatica</i>	White-winged Dove	WWDO
Columbidae	<i>Zenaida macroura</i>	Mourning Dove	MODO
Cuculidae (Neomorhinae)	<i>Geococcyx californianus</i>	Greater Roadrunner	GRRO
Strigidae	<i>Strix varia</i>	Barred Owl	BADO
Apodidae	<i>Chaetura pelagica</i>	Chimney Swift	CHSW
Trochilidae (Trochilinae)	<i>Archilochus alexandri</i>	Black-chinned Hummingbird	BCHU
Picidae (Picinae)	<i>Melanerpes aurifrons</i>	Golden-fronted Woodpecker	GFWO
Picidae (Picinae)	<i>Picoides scalaris</i>	Ladder-backed Woodpecker	LBWO
Picidae (Picinae)	<i>Picoides pubescens</i>	Downy Woodpecker	DOWO
Tyrannidae (Fluvicolinae)	<i>Sayornis phoebe</i>	Eastern Phoebe	EAPH
Tyrannidae (Tyranninae)	<i>Tyrannus forficatus</i>	Scissor-tailed Flycatcher	STFL
Vireonidae	<i>Vireo griseus</i>	White-eyed Vireo	WEVI
Corvidae	<i>Cyanocitta cristata</i>	Blue Jay	BLJA
Corvidae	<i>Aphelocoma californica</i>	Western Scrub-Jay	WESJ
Corvidae	<i>Corvus brachyrhynchos</i>	American Crow	AMCR
Hirundinidae (Hirundinae)	<i>Progne subis</i>	Purple Martin	PUMA
Hirundinidae (Hirundinae)	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	CLSW
Hirundinidae (Hirundinae)	<i>Hirundo rustica</i>	Barn Swallow	BARS
Paridae	<i>Poecile carolinensis</i>	Carolina Chickadee	CACH
Paridae	<i>Baeolophus bicolor</i>	Tufted Titmouse	TUTI
Paridae	<i>Baeolophus atricristatus</i>	Black-crested Titmouse	BCTI
Troglodytidae	<i>Thryothorus ludovicianus</i>	Carolina Wren	CARW
Troglodytidae	<i>Thryomanes bewickii</i>	Bewick's Wren	BEWR
Troglodytidae	<i>Catherpes mexicanus</i>	Canyon Wren	CANW

Other Wildlife Species Detected US 281 2014 GCWA Survey			
Species Identification*			
Family (Subfamily)	Scientific Name	Common Name	Code
Regulidae	<i>Regulus calendula</i>	Ruby-crowned Kinglet	RCKI
Mimidae	<i>Mimus polyglottus</i>	Northern Mockingbird	NOMO
Sturnidae	<i>Sturnus vulgaris</i>	European Starling	EUST
Parulidae	<i>Vermivora ruficapilla</i>	Nashville Warbler	NAWA
Emberizidae	<i>Aimophila ruficeps</i>	Rufous-crowned Sparrow	RCSP
Emberizidae	<i>Spizella passerina</i>	Chipping Sparrow	CHSP
Cardinalidae	<i>Piranga rubra</i>	Summer Tanager	SUTA
Cardinalidae	<i>Passerina caerulea</i>	Blue Grosbeak	BLGR
Cardinalidae	<i>Cardinalis cardinalis</i>	Northern Cardinal	NOCA
Cardinalidae	<i>Passerina caerulea</i>	Painted Bunting	PABU
Cardinalidae	<i>Spiza americana</i>	Dickcissel	DICK
Icteridae	<i>Euphagus carolinus</i>	Rusty Blackbird	RUBL
Icteridae	<i>Quiscalus mexicanus</i>	Great-tailed Grackle	GTGR
Icteridae	<i>Molothrus ater</i>	Brown-headed Cowbird	BHCO
Fringillidae	<i>Carpodacus mexicanus</i>	House Finch	HOFI
Fringillidae (Carduelinae)	<i>Carduelis psaltria</i>	Lesser Goldfinch	LEGO
MAMMALS			
Leporidae	<i>Sylvilagus floridanus</i>	Eastern cottontail	
Sciuridae	<i>Spermophilus variegatus</i>	Rock squirrel	
Sciuridae	<i>Sciurus niger</i>	Eastern fox squirrel	
Procyonidae	<i>Procyon lotor</i>	Raccoon	
Cervidae	<i>Odocoileus virginianus</i>	White-tailed deer	

Appendix D

U.S. Fish and Wildlife Concurrence Letter



United States Department of the Interior

FISH AND WILDLIFE SERVICE

10711 Burnet Road, Suite 200

Austin, Texas 78758

512 490-0057

FAX 490-0974



MAY 11 2011

Lisa Adelman
Legal Counsel
Alamo Regional Mobility Authority
1222 N. Main Avenue, Suite 1000
San Antonio, Texas 78212

Consultation Number 21450-2011-F-0180

Dear Ms. Adelman:

This letter responds to the Alamo Regional Mobility Authority's (Alamo RMA) October 18, 2010, letter requesting concurrence from the U.S. Fish and Wildlife Service (Service) that two years of absence data from surveys for the golden-cheeked warblers (*Dendroica chrysoparia*) and black-capped vireo (*Vireo atricapilla*) along the proposed Loop 1604 and US 281 project route are sufficient to conclude that neither species is likely to occur within either project area. Both species are species listed pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*)(Act).

Section 7 of the Act requires that all Federal agencies consult with the Service to ensure that the actions authorized, funded, or carried out by such agencies do not jeopardize the continued existence of any threatened or endangered species or adversely modify or destroy critical habitat of such species. The Federal Highway Administration (FHWA) is the Federal agency associated with this proposed action.

US 281

Alamo RMA conducted habitat assessments for both bird species in 2009 within the US 281 study area. Alamo RMA determined that habitat for golden-cheeked warbler is present in the project area and that suitable black-capped vireo habitat does not occur within the project area, therefore, no surveys to detect black-capped vireos were conducted. Surveys for golden-cheeked warbler were conducted in the study area in 2009; in 2010 surveys were conducted in areas along the right-of-way where access was granted. The results of two years of survey data for golden-cheeked warbler collected in the US 281 project area indicate that the species is absent from the surveyed areas.

1604 Loop

Initially, the 1604 Loop project area extended from I-35 to Potranco Road. Accordingly, in 2009 Alamo RMA assessed habitat and surveyed for presence/absence of black-capped vireo and golden-cheeked warbler in the project area. In 2010, the project area was expanded to include



the area from I-35 to US 90. Again, Alamo RMA conducted habitat assessments and presence/absence surveys for both species in the initial and expanded project area. At the end of the breeding season in 2010, areas assessed as suitable habitat within the initial project had been surveyed twice and areas of habitat in the expanded project area had been surveyed once. The Service understands that Alamo RMA is conducting a second year of survey in the expanded area during the 2011 breeding season. At the time of this letter, the 2011 surveys are ongoing and the results will not be available until after the survey season. If, after two consecutive years of survey data for each area results in absence of the golden-cheeked warbler and black-capped vireo in the project area, then the Service agrees with Alamo RMA that additional surveys at this time would render very little if any useful information to make an effects determination pursuant to section 7 of the Act. However, modifications to the proposed project or the addition of new information that suggests listed species or critical habitat may be affected by your proposed project should be submitted to our office for further consideration. Furthermore, the Service recommends that surveys be conducted if construction is delayed more than three years from the date of this letter in order to ensure that the areas are still unoccupied.

If you have any questions or comments, please contact Tanya Sommer at 512-490-0057, extension 222.

Sincerely,



Adam Zerrenner
acting Field Supervisor

cc: Justin Ham, FHWA, Austin, Texas
Vicky Crnich, TxDOT, ENV, Austin, Texas

Appendix E

Texas Commission on Environmental Quality Total Suspended Solids Calculations



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1.1 BACKGROUND

1.1.1 Introduction

The US 281 Environmental Impact Statement (EIS) is being prepared for the Alamo Regional Mobility Authority (Alamo RMA) to evaluate improvements to the US 281 roadway from Loop 1604 to Borgfeld Drive. The project limits fall completely within Bexar County and include the floodplains of Mud Creek, two unnamed tributaries to Mud Creek, an unnamed tributary of Cibolo Creek, an unnamed tributary to West Elm Creek, Borgfeld Creek, and Cibolo Creek.

1.1.2 Purpose

This report outlines the procedure used to evaluate the compliance of the Preferred Expressway Alternative to meet the current regulatory requirements mandated by the Texas Commission on Environmental Quality (TCEQ), as well as the City of San Antonio requirement that proposed storm water runoff not increase from original conditions. One No-Build Alternative and two Build Alternatives (Expressway Alternative and Elevated Expressway Alternative) were evaluated in the US 281 Draft EIS; the Expressway Alternative was identified as the Preferred Alternative and is included in this report.

1.1.3 Proposed Alternative

Preferred Expressway Alternative

The Preferred Expressway Alternative extends approximately 7.3 miles from Loop 1604 to Borgfeld Drive. This alternative consists of two general purpose lanes and one managed lane (total of three), full access-controlled through travel lanes in each direction (**Figure E-1**) south of Stone Oak Parkway. North of Stone Oak Parkway, the Preferred Expressway Alternative transitions to three managed, full access-controlled through travel lanes in each direction (**Figure E-2**). No streets or driveways would access the through lanes directly. Grade separations would be provided at Sonterra Boulevard, Redland Road, Encino Rio, Evans Road, Stone Oak Parkway, Marshall Road, Wilderness Oaks, Overlook Parkway, Bulverde Road, and Borgfeld Drive to allow the general purpose/managed lanes to pass uninterrupted over the cross streets; thus, the general purpose/managed lanes would not intersect directly with these local streets. From Loop 1604 to approximately Stone Oak Parkway, the general purpose/managed lanes would be situated between partial access-controlled outer lanes, also known as frontage roads. From approximately Stone Oak Parkway to Borgfeld Drive, the main lanes would be managed and the outer lanes would function as US 281. The outer lanes, which would cross local streets at grade via signalized intersections, would be continuous for the length of the proposed project and serve local traffic by providing direct access to businesses, neighborhoods and connecting streets. Four non-toll direct connector ramps would be provided at Loop 1604 to provide main lane to main lane connections for US 281 motorists travelling westbound Loop 1604 to northbound US 281, southbound US 281 to eastbound Loop 1604, eastbound Loop 1604 to northbound US 281, and southbound US 281 to westbound Loop 1604. From north of Evans Road to the south of Marshall Road, the main lanes would be separated by the addition of ramps providing access to the VIA Park and Ride Facility at Stone Oak Parkway. The proposed ROW would typically be 400 feet wide. The Preferred Expressway Alternative requires approximately 79 acres of additional ROW.

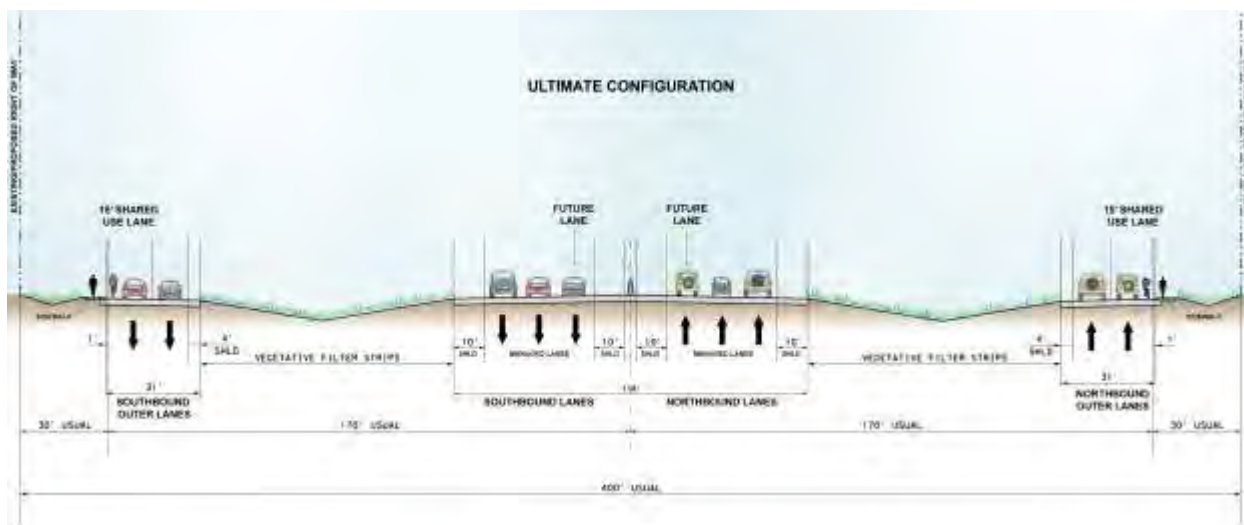


Figure E-1: Preferred Expressway Alternative typical section south of Stone Oak Parkway



Source: US 281 EIS Team, 2014.

Figure E-2: Preferred Expressway Alternative typical section north of Stone Oak Parkway



Source: US 281 EIS Team, 2014.

1.1.4 Regulatory Requirements

The Preferred Expressway Alternative is located in the recharge zone of the Edwards Aquifer and is thus subject to Title 30 Chapter 213 of the Texas Administrative Code, which regulates any activity having the potential for polluting the Edwards Aquifer and hydrologically connected surface streams.

As previously noted, this alternative proposes the addition of impermeable surfaces, primarily in the form of expanded roadways, which prevent the natural infiltration of water into the soil and are therefore defined by TCEQ as impervious cover areas. Impervious cover increases the potential for surface water contamination with suspended solids, thus introducing an increased risk of groundwater degradation. To prevent contaminated storm water from reaching downstream receiving waters and groundwater, TCEQ regulates the total suspended solids (TSS) load permitted to leave the site by requiring a reduction in TSS load associated with development by at least 80 percent. This would be



accomplished by implementing an Edwards Aquifer protection plan, which must be filed and approved in compliance with TCEQ regulations prior to commencement of construction. The rules and regulations for any regulated activity within the Edwards Aquifer recharge zone are available for reference in Texas Administrative Code Title 30 Chapter 213 Subchapter A.

Acceptable methods of solids removal are listed in the TCEQ Technical Guidance Manual (*Complying with the Edwards Aquifer Rules – Technical Guidance on Best Management Practices*, TCEQ, July 2005) which includes design criteria.

1.2 METHODOLOGY

The purpose of this study is to determine best management practices (BMPs) that comply with the TCEQ Edwards Aquifer Protection Program rules for the proposed alternative. Each BMP will be designed to meet the required TSS removal as required by TCEQ. TSS removal is achieved by directing the first flush of runoff, storm water containing this high initial pollutant load, to a BMP designed to hold the volume required by TCEQ calculations.

1.2.1 Treatment Method

The water quality loads were calculated for each drainage basin. After evaluating the slopes and available area it was determined that bioretention would be the primary BMP used, and vegetated filter strips would be used where space and slopes allowed.

Bioretention - All bioretention areas will be designed to be 5 feet deep, filled with media for 4.5 feet, with 0.5 feet of room on top for ponding, and with a gravel underdrain below the media. A 5-10 foot strip of grass will be added to the approach boundary (on the sides where the water flows into the bioretention area) and the water will drain to grass-lined channels before entering the bioretention area.

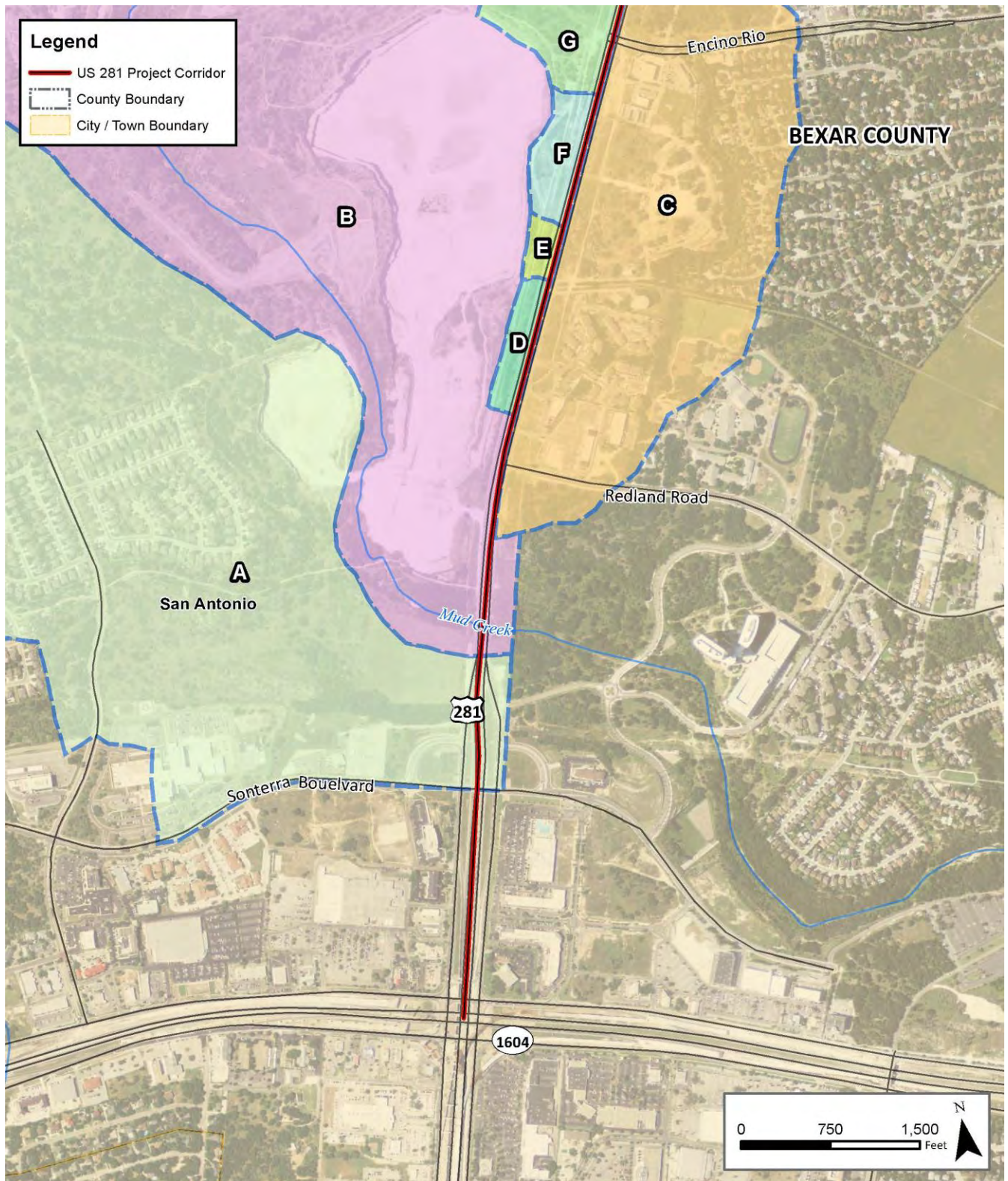
Vegetated Filter Strip- These vegetated strips will be at least 15 feet wide next to the roadway, and essentially flat with low slopes (less than 20 percent). These strips will only be utilized when the pavement area draining to strip is less than 72 feet wide.

1.2.2 Watersheds and Drainage Basins

The US 281 Corridor Project is primarily located within the Salado Creek watershed, but also within the Cibolo Creek watershed on the northern most portion of the project. Within the Salado Creek watershed the project is within the Mud Creek, Elm Waterhole Creek, and West Elm Creek sub-watersheds. These watersheds were further subdivided into 23 drainage basins. These basins are determined based on site topography and the proposed improvements. The BMPs have been designed to treat the TSS increase within each individual drainage basin. The 23 drainage basins are shown and labeled “A” through “W” in **Figure E-3a – e**.

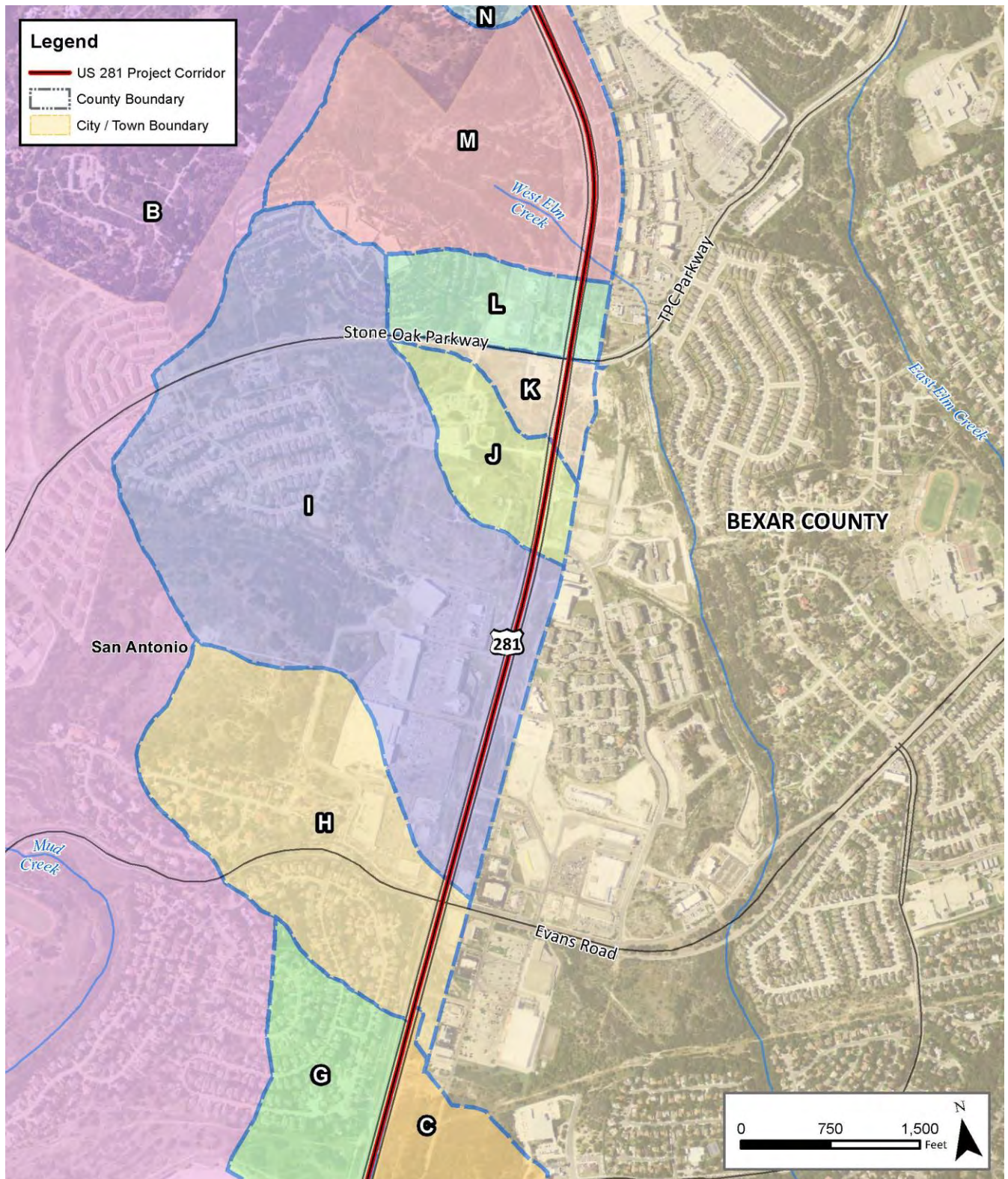


Figure E-3a: Drainage basins surrounding the Preferred Expressway Alternative



Source: US 281 EIS Team, 2014

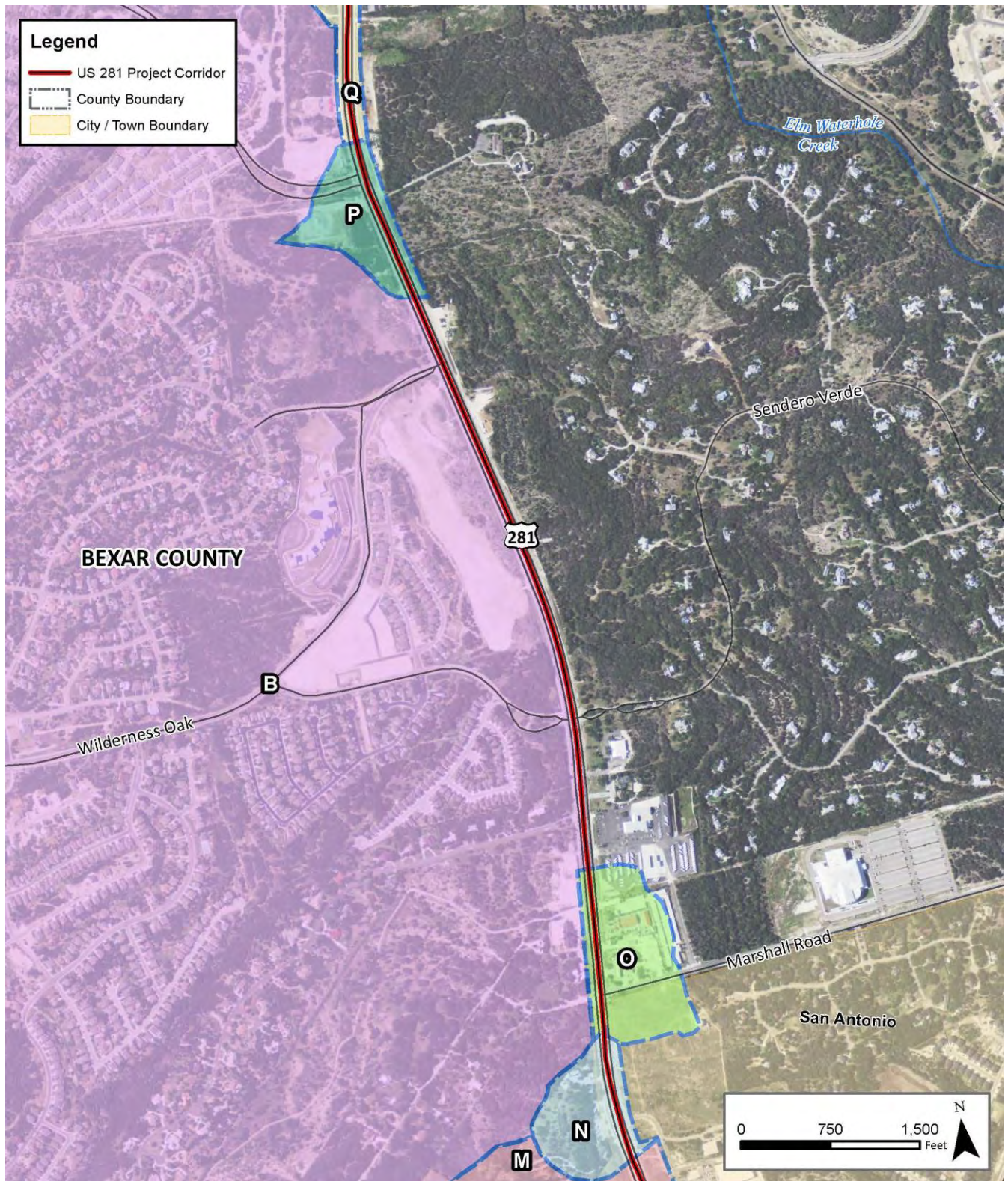
Figure E-3b: Drainage basins surrounding the Preferred Expressway Alternative



Source: US 281 EIS Team, 2014

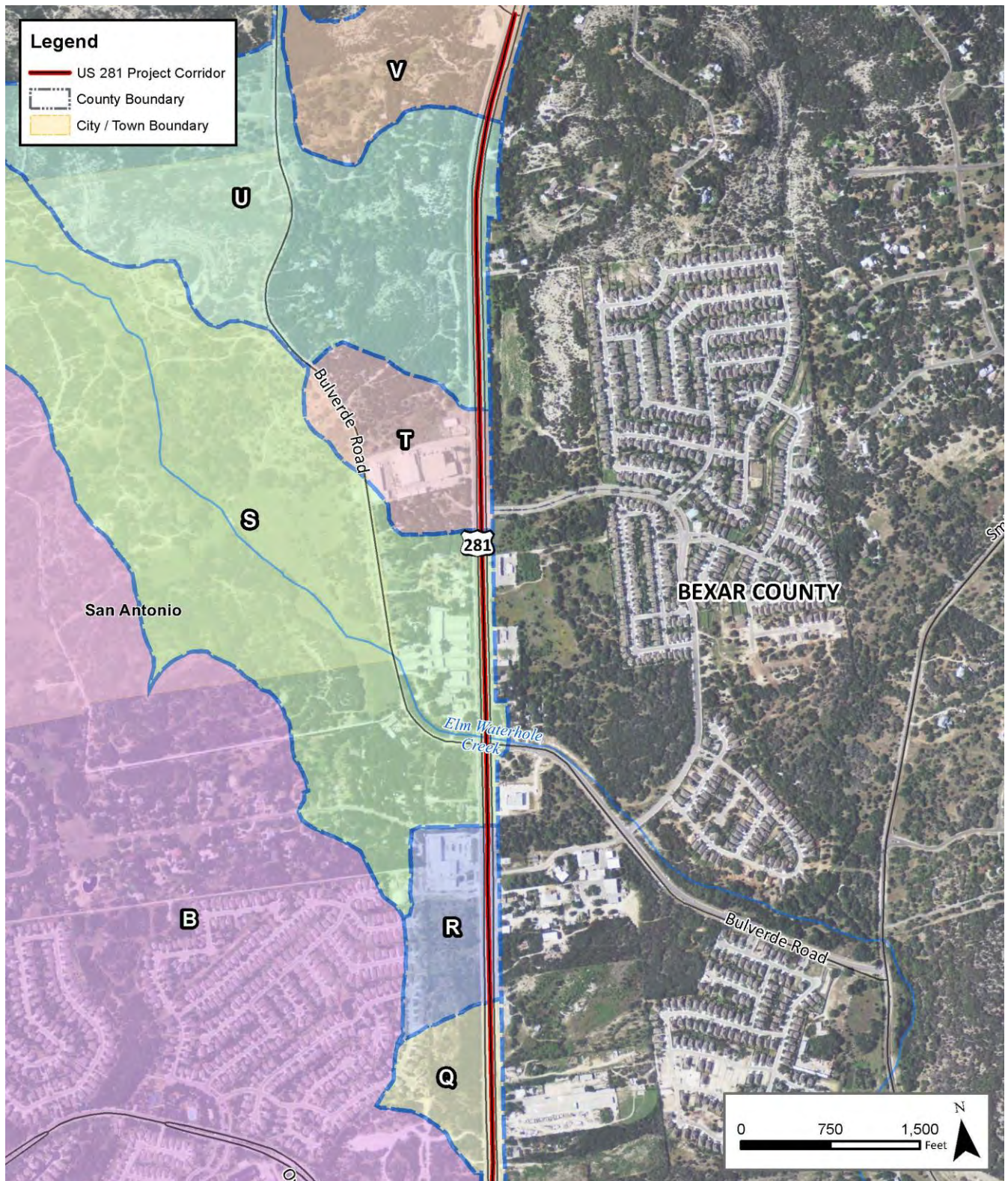


Figure E-3c: Drainage basins surrounding the Preferred Expressway Alternative



Source: US 281 EIS Team, 2014

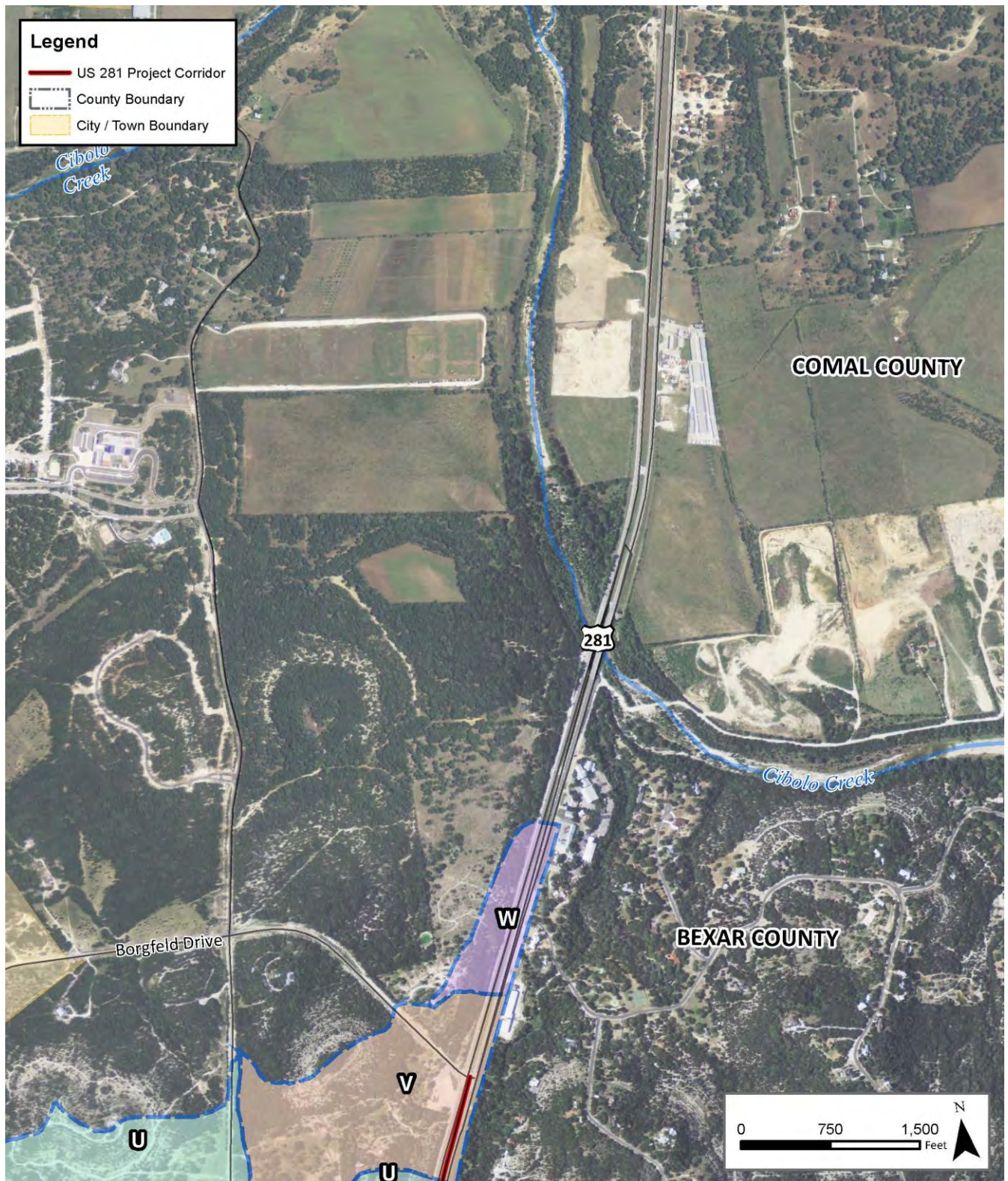
Figure E-3d: Drainage basins surrounding the Preferred Expressway Alternative



Source: US 281 EIS Team, 2014



Figure E-3e: Drainage basins surrounding the Preferred Expressway Alternative



Source: US 281 EIS Team, 2014



Some larger watersheds were divided into multiple sections since bioretention is limited to 10-acre drainage areas. For Drainage Basin A, the proposed BMPs were increased by 20 percent to account for impervious areas under the direct connectors.

1.2.3 Calculations

Calculations have been performed using TCEQ's equations/spreadsheet for TSS generation and removal. Summary sheets from those calculations are included as **Appendix A**. BMP sizes required for appropriate TSS removal have also been calculated and are presented in the summary.

Inputs required for the TSS calculations included the total project area, the county in which the project resides (for rainfall determination) and the amount of existing and proposed impervious areas. As mandated by TCEQ, 80 percent is the required removal of the increase in TSS. All existing impervious cover is assumed to have been installed per regulatory rules (if any) at the time of their installation. There are no requirements for the treatment of the existing impervious cover; therefore, the BMPs will only treat the additional TSS created from the increase in impervious cover by the proposed alternative.

1.2.4 Procedure

Electronic files of the proposed alternative were used to obtain all proposed impervious cover calculations. The procedure below has been used to evaluate the proposed alternative:

1. Generate impervious areas using CAD within the ROW for the alternative.
2. Combine existing and proposed areas in order to obtain the total post construction impervious cover.
3. Identify potential locations for water quality BMPs.
4. Calculate existing and proposed impervious cover within each watershed defined by locations of BMPs.
5. Use spreadsheet to determine the TSS removal goals for each watershed and estimate BMP volumes to achieve the required removal.
6. Examine the footprint of the BMPs required and develop proposed ROW needs.

1.2.5 Assumptions and Clarifications

The following assumption has been made in the development of this analysis:

- All existing impervious cover is assumed to have been installed per regulatory rules (if any) at the time of their installation and no treatment will be included in calculations for existing impervious cover. There are no requirements for treating existing impervious cover, only the increased impervious cover from the proposed project.



1.3 EVALUATION

1.3.1 Evaluation Criteria

The Preferred Expressway Alternative was evaluated using the following questions:

- Does this alternative meet the TSS removal requirements set by TCEQ?
- Can the TSS removal requirement be met utilizing the proposed ROW for the Preferred Expressway Alternative?

1.3.2 Evaluations Results

The following table presents a summary of the results.

Table E-1: Summary of Results

Alternative	Total Number of Major Watersheds	Total Number of BMP Watersheds/ Basins	Total TSS Removal Required (lbs.)	TCEQ Requirements Met (Y/N)	Number of Basins Requiring Additional ROW
Preferred Expressway Alternative	23	23	48,633	Y	0

Source: US 281 EIS Team, 2012

1.3.3 Ability to Meet Required Treatment Threshold

As shown in **Table E-1** above, the Preferred Expressway Alternative evaluated is capable of meeting the TCEQ requirements for TSS removal.

1.3.4 Additional Right of Way Requirements to Accommodate BMPs

The Preferred Expressway Alternative would not require additional ROW beyond the proposed ROW for the accommodation of BMPs.

1.4 CONCLUSIONS

The Preferred Expressway Alternative is able to meet the current regulatory requirements set forth by TCEQ for the entire project area. Therefore, a WPAP in accordance with current regulations will be prepared prior to construction.



As previously mentioned, bioretention and vegetated filter strips were identified as the preferred BMPs for the Preferred Expressway Alternative; however, there are several other options of permanent controls approved by TCEQ, including:

- Sand Filter Basins
- Retention/Irrigation
- Extended Detention Basins
- Grassy Swales
- Wet Basins
- Constructed Wetlands
- Permeable Concrete

Various innovative technologies have also been approved by TCEQ for use within the recharge zones of the Edwards Aquifer including:

- Contech StormFilter
- Stormceptor
- Vortechs

This list is subject to change by TCEQ and all methods should be verified with TCEQ's current approved list at the time of final design.

Appendix A - Impervious Cover Summary and Water Quality Summary

Impervious Cover and Water Quality Summary – Preferred Expressway Alternative

Basin Name	Area (ac)	Existing On-Site Impervious Area (ac)	Proposed On-Site Impervious Area (ac)	Proposed Increase in Impervious Area (ac)	Existing On-Site % Impervious	Proposed On-Site % Impervious	Required Water Quality Volume for Bioretention (cu ft)	Depth (ft)	Calculated Width (ft)	Calculated Length (ft)	Proposed Width (ft)	Proposed Length (ft)
A1	9.93	5.37	6.29	0.93	54.02%	63.34%	1,350	5	16.43	16.43	18	18
A2	9.93	5.37	6.29	0.93	54.02%	63.34%	1,350	5	16.43	16.43	18	18
A3	9.93	5.37	6.29	0.93	54.02%	63.34%	1,350	5	16.43	16.43	18	18
A4	9.93	5.37	6.29	0.93	54.02%	63.34%	1,350	5	16.43	16.43	18	18
B1	8.62	2.54	6.73	4.19	29.46%	78.07%	10,937	5	46.77	46.77	47	47
B2	8.62	2.54	6.73	4.19	29.46%	78.07%	10,937	5	46.77	46.77	47	47
C	10.14	2.36	6.41	4.05	23.27%	63.22%	9,567	5	43.74	43.74	44	44
D	7.55	1.71	5.27	3.56	22.62%	69.71%	9,264	5	43.04	43.04	43.5	43.5
E1	6.99	2.60	4.77	2.17	37.11%	68.19%	4,343	5	29.47	29.47	30	30
E2	6.99	2.60	4.77	2.17	37.11%	68.19%	4,343	5	29.47	29.47	30	30
F1	6.38	1.69	4.37	2.68	26.47%	68.37%	6,457	5	35.93	35.93	36	36
F2	6.38	1.69	4.37	2.68	26.47%	68.37%	6,457	5	35.93	35.93	36	36
G1	5.90	1.86	4.38	2.51	31.59%	74.21%	5,974	5	34.57	34.57	35	35
G2	5.90	1.86	4.38	2.51	31.59%	74.21%	5,974	5	34.57	34.57	20	62
H1	7.64	2.32	5.43	3.11	30.42%	71.08%	7,258	5	38.10	38.10	20	62
H2	7.64	2.32	5.43	3.11	30.42%	71.08%	7,258	5	38.10	38.10	20	62
H3	7.64	2.32	5.43	3.11	30.42%	71.08%	7,258	5	38.10	38.10	20	62
I1	7.66	2.00	4.90	2.90	26.12%	64.00%	6,743	5	36.72	36.72	37	37
I2	7.66	2.00	4.90	2.90	26.12%	64.00%	6,743	5	36.72	36.72	37	37
J	10.21	3.51	6.63	3.12	34.42%	64.95%	6,225	5	35.28	35.28	35.5	35.5
K	8.15	2.17	4.89	2.72	26.62%	59.98%	6,098	5	34.92	34.92	35	35
L1	10.97	2.20	5.88	3.68	20.04%	53.61%	8,799	5	41.95	41.95	42	42
L2	10.97	2.20	5.88	3.68	20.04%	53.61%	8,799	5	41.95	41.95	42	42
M1	9.32	2.36	5.31	2.96	25.30%	57.00%	6,637	5	36.43	36.43	37	37
M2	9.32	2.36	5.31	2.96	25.30%	57.00%	6,637	5	36.43	36.43	37	37
N	11.32	3.37	7.23	3.86	29.79%	63.91%	8,504	5	41.24	41.24	41.5	41.5
O1	10.33	2.51	6.25	3.73	24.33%	60.45%	8,542	5	41.33	41.33	20	88
O2	10.33	2.51	6.25	3.73	24.33%	60.45%	8,542	5	41.33	41.33	20	88
O3	10.33	2.51	6.25	3.73	24.33%	60.45%	8,542	5	41.33	41.33	20	88
O4	10.33	2.51	6.25	3.73	24.33%	60.45%	8,542	5	41.33	41.33	20	88
P1	7.81	2.05	4.10	2.06	26.20%	52.54%	4,351	5	29.50	29.50	30	30

Basin Name	Area (ac)	Existing On-Site Impervious Area (ac)	Proposed On-Site Impervious Area (ac)	Proposed Increase in Impervious Area (ac)	Existing On-Site % Impervious	Proposed On-Site % Impervious	Required Water Quality Volume for Bioretention (cu ft)	Depth (ft)	Calculated Width (ft)	Calculated Length (ft)	Proposed Width (ft)	Proposed Length (ft)
P2	7.81	2.05	4.10	2.06	26.20%	52.54%	4,351	5	29.50	29.50	30	30
Q1	7.47	1.66	4.22	2.56	22.18%	56.48%	5,942	5	34.47	34.47	35	35
Q2	7.47	1.66	4.22	2.56	22.18%	56.48%	5,942	5	34.47	34.47	35	35
Q3	7.47	1.66	4.22	2.56	22.18%	56.48%	5,942	5	34.47	34.47	35	35
R1	10.91	4.26	6.49	2.22	39.10%	59.48%	3,793	5	27.54	27.54	28	28
R2	10.91	4.26	6.49	2.22	39.10%	59.48%	3,793	5	27.54	27.54	28	28
S1	9.93	4.77	5.89	1.13	48.00%	59.33%	1,690	5	18.39	18.39	18.5	18.5
S2	9.93	4.77	5.89	1.13	48.00%	59.33%	1,690	5	18.39	18.39	18.5	18.5
T1	6.46	2.30	3.09	0.79	35.55%	47.84%	1,251	5	15.82	15.82	16	16
T2	6.46	2.30	3.09	0.79	35.55%	47.84%	1,251	5	15.82	15.82	16	16
U1	9.05	2.22	4.14	1.92	24.50%	45.76%	3,857	5	27.77	27.77	28	28
U2	9.05	2.22	4.14	1.92	24.50%	45.76%	3,857	5	27.77	27.77	28	28
V	10.58	4.20	5.15	0.95	39.69%	48.64%	1,420	5	16.85	16.85	17	17
W1	10.70	2.48	4.29	1.81	23.17%	40.06%	3,459	5	26.30	26.30	27	27
W2	10.70	2.48	4.29	1.81	23.17%	40.06%	3,459	5	26.30	26.30	27	27
W3	10.70	2.48	4.29	1.81	23.17%	40.06%	3,459	5	26.30	26.30	27	27